

AVIATION WEEK

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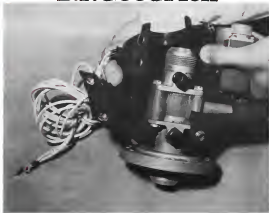
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AVIATION CALENDAR

Dec. 12-M-S-Nachre Engineering & Service Congress & Assoc. Exposition, sponsored by Engineers Inst. Council, Philadelphia, Cleveland, Ohio.

Dec. 13-17-Fall Meeting, USA National Committee, 1924 International Radio Scientific Union, University of Florida, Gainesville, Fla.

Dec. 15-National Wright Brothers Luncheon, 11 S. Chamber of Commerce Bldg., Arlington, Wash., D. C.; Wright Dir. Dinner at Sheraton Park Hotel.

Jan. 9-10-Secord National Symposium on Reliability and Quality Control in Electronic Systems, sponsored by Institute of Radio Engineers, Hotel Statler, Washington.

Jan. 9-10-Symposium of Antennas Engineers, Annual Meeting, Scientific Council and Statler Hotel, Detroit.

Jan. 19-21-National Simulation Conference sponsored by Defense Post World Group of Institute of Radio Engineers' Group on Electronic Computers, Dallas, Tex.

Jan. 21-23-Institute of the Aeronautical Sciences, 11th annual meeting, Sheraton Hotel Hotel, New York, N. Y. Jan. 21-23-National Night Dinner.

Jan. 23-25-12th Maintenance & Engineering Shop and Conference, Concordia Hall, Philadelphia.

Feb. 12-Virtual Symposium on Micro-wave Technology, sponsored by Institute of Radio Engineers' Section A, Professional Group and Theory & Technology Group, Philadelphia.

Feb. 18-Society of the Plastics Institute, 11th annual National Plastics Division Conference, Chalfont-Haddon Hall, Allentown, Pa.

Mar. 18-19-Society of Automotive Engineers, national production meeting and luncheon, Hotel Statler, Cleveland, Ohio.

Apr. 8-10-Society of Automotive Engineers, national automatic meeting, automobile production forum and aircraft engineering symposium, Hotel Statler, New York, N. Y.

Apr. 10-11-Symposium for Management on Application of Axiom Computers, sponsored by Midwest Electronic Institute, University of Kansas City, Kansas City, Mo.

Apr. 22-24-American Association of Art and Engineers, 19th annual convention, Hotel Statler, Cleveland, Ohio.

May 1-Society of Automotive Engineers, 19th annual convention, Fort Worth, Tex.

May 14-17-First Design Engineering Show Convention Bldg., Philadelphia. Managed by Corp & Polak, Inc., 141 Madison Ave., New York, N. Y.

June 1-3-Society of the Plastics Institute, Seventh National Plastics Exposition, New Columbia Hotel, New York, N. Y.

June 17-21-American Society of Mechanical Engineers, annual meeting, Hotel Statler, Cleveland, Ohio.

June 17-21-American Society for Testing Materials, 11th annual meeting and 11th symposium, Chalfont-Haddon Hall, Allentown, Pa.

June 25-26-The Council of the International Civil Aviation Organization, 10th session, Caracas, Venezuela.

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Washington Roundup

Tipton to Head ATA?

Sheel G. Tipton, general counsel of the Air Transport Assn., is expected to be named president of ATA Dec. 15 following the abrupt resignation of Harold "Red" Pearson after less than six months in office.

Once previously mentioned for the top ATA post, Tipton, for the first time, is an active candidate to head the trade association of scheduled airlines. Tipton's candidacy has developed substantial support among the member airlines, who have decided to vote from their own organizations in better than "being a pig-in-the-poke."

Tipton's record in his 11-year service to the airlines as ATA general counsel is considered remarkable in the industry. He is the industry's most articulate and effective spokesman in the Congress. He has guided the defense of ATA as acting president on several occasions when the office was vacant. It is felt that the election of Tipton would eliminate the lack of one though that has existed in the office of ATA president for the past two years. Failure to fill the job now would mean no action until the Board of Directors meets next June creating an ineffective situation that the airlines want to avoid.

Pearson's resignation is subject to the naming of his successor. Elected to the \$47,500-a-year job only last July, Pearson wrote the ATA directors that "I should not want to be re-elected at the next board meeting on Dec. 15." He told the directors "You can be assured of my continued cordialship until a successor is elected. I have made this decision for reasons which I will be glad to discuss with you."

And reason for Pearson's departure is that he was asked to leave. He was told that he could not be re-elected. ATA members had been disappointed over the Pearson administration since it became apparent he had misunderstood the purpose of ATA and the function of president.

The airlines were signs over Pearson's appointment to policies dictated by the ATA board of directors. He rejected their economic philosophy, the concept of a regulated industry, the role of scheduled airlines in national defense and the ATA position on non-scheduled airlines.

According to Pearson it was all pretty much a matter of misunderstanding. He publicly refuted his charges for leaving ATA at an Airlines Finance Committee meeting in New Orleans where he had gone to discuss ATA functions. He said, "ATA has not been well managed nor is it a good organization. I have found ATA to be a loose confederation of conflicting interests. Thus, because I was troubled in the character of the organization and the character of the office of president, I decided not to ask re-election."

Army Missile Move

U. S. Army lightened its lines in the infrastructure missile fight with the assignment of Maj. Gen. John B. Medaris to Redstone Arsenal, Huntsville, Ala., the Army's Guided Missile Command. Gen. Medaris will not replace Brig. Gen. H. N. Taffin, as commanding general of Redstone. Army Ordnance would not reveal the title of the assignment, would only say that Gen. Medaris will head a "special missile group"—Postponed for a non-existence.

Army officials are moving rapidly to shake out the missile role after Defense Secretary Charles E. Wilson said that he liked to see competition in missile development, didn't want to confine the missile effort to any one service.

Gen. Medaris takes over his new assignment Feb. 1 following three and half years in the office of Chief of Ordnance where he headed the Industrial Division which produces Army missiles. He is widely respected in the Army as a tough-minded fighter. He led the Army counterattack during the congressional investigation of an ammunition shortage during the height of the Korean war. "He is one of our greatest assets," a fellow officer said.

Meanwhile, missile problems kept the missile system needed. Recent plans to submit information about General Armament Laboratory's license to manufacture missiles was cancelled at the last minute by the Army. General representatives were in New York for the day after Thanksgiving and missed the press. And as they were talking in the press, a call from the Pentagon revoked clearance to make the announcement.

This decision is a reflection of the conflict of opinion within the Army over security on its missile program. Research and Development specialists believe that no progress is served by holding up release of information after a missile has passed through the final development stages and is ready for production. They believe the Army would gain greatly by talking about its missile funds. On the other side of the argument are the Army's operations which who feel strongly that security should continue to mask the Army's missile program.

Rizley to Deport

Ross Rizley is expected to leave the Civil Aeronautics Board early next year to accept a Federal judgeship in his home state of California. For several months there has been speculation that the chairman would leave the Board for the Federal bench. The move has been brought to a head by the retirement, effective Jan. 7, of a Federal judge in Oklahoma, giving the White House an opening for Rizley.

While Rizley is a Republican and Congress is under Democratic control, no trouble is expected with his confirmation.

Rizley's departure means that the Administration will have to fill two vacancies next year, as well as name a new chairman since Rizley was reappointed chairman on Dec. 1 for the coming year. Chances of the reappointment of John Lee to the Board when his term expires at the end of the month are very slight.

ALPA and AFL

The American Federation of Labor took steps to make the charter of the Air Line Pilots Assn. at the AFL and the Congress of Industrial Organizations met in New York to merge their organizations. The AFL voted to make ALPA's charter Dec. 12 unless the dispute between the pilots and the Flight Engineers International Assn. was settled before then. The two AFL unions have decided to merge the Flight Engineers strike against United Air Lines.

ALPA has presented its case to the AFL and the groups held discussions last week in an effort to settle the dispute. —Washington staff

AVIATION WEEK

USAF, Army Battle Over Airpower Roles

VOL. 62, NO. 24
DECEMBER 32, 1955

Sagebrush ground forces refuse to use Air Force copters for assault missions, cancel evacuation test.

By Claude Wince

Fort Poff, La.—The U.S. Air Force and Army are deep in an inter-service fight that may dwarf the B-36 controversy of 1947.

This is the inescapable conclusion after a month of Exercise Sagebrush, August U.S. military maneuvers near World War II.

Whatever the maneuver proves or fails to prove about the conduct of war in a atomic age, these facts probably will be secondary to assumptions galvanized by both sides for use in next year's budget battle on Capitol Hill.

The stakes are enormous, particularly in terms of American national security at a time when Russian technological advances have given that twenty long-range bombing capability and a 15-minute H-bomb to deliver.

Service Differences

Despite efforts of both branches to keep their differences from the public eye, these situations have come to light here in the last three weeks:

- U.S. Army will not use Air Force helicopters for assault missions (AW Nov. 31, p. 17).
- U.S. Air Force has disallowed Army's introduction of Sky Cavalry for

noncombatant assault missions (AW Nov. 28, p. 11).

• Sagebrush exercises, probably in Army uniform, forced cancellation of a cross service maneuver test. It had been scheduled as a joint evolution exercise of the 40th Troop Carrier Wing of Arlington AFB, Okla., but with a dozen of its first F4H-1G C-123s scrubbed from participation.

It is highly significant that at least two of these items involve interpretation, if not outright violation, of the 1952 USAF-Army Memorandum of Understanding that defined missions of the armed forces.

In one of them, the cross over Sky Cavalry, the Secretary of the Air Force upheld his field commander's interpretation of the agreement, thus ordered him to make an exception in Louisiana. USAF Secretary Donald Quarles told Gen. Otto P. Weyland, maneuver director, to let the Army carry out its experiments "without prejudice" to the basic issue.

This was done while top military commanders at Fort Poff, held their heads and Secretary Quarles refused to allow Army's plan to use Weyland's base on Sky Cavalry Army Secretary Wilbur Brasher.

The case of the C-123 test may be more important, but hopeful consideration apparently was not accorded.

Essence of the matter was that a simulated assault mission was to be executed in the midst of a troop evacuation mission. It was to result in about 800 casualties in addition to soldiers killed outright by the blast.

Evacuation Plan
The 500 wounded by the blast were to be evacuated by helicopter to an airstrip 90 miles away. Blaw then was to be shifted to C-123 aircraft, flown to England AFB, then into Douglas C-124 transports for the final leg to rear echelon hospitals.

Essentially, it was a field exercise for the Eighteenth Air Force, showing its capability in medical evacuation. The C-123 is a new aircraft and one that would play a key role in such a situation in the event of a real war.

The bomb went off on schedule at 6 a.m. on the day of the planned test. At the time USAF had standing in at England AFB were C-127s, 16 F-105s, 18 C-123s and a lot of basic with capacity for approximately 800 persons. The C-124 plane of the test was eliminated because most of the planes were undergoing a propeller check.

A group of reporters and photographers who had been invited to cover the story assembled at Fort Poff some

Army Aircraft Limits

The Memorandum of Understanding between the U.S. Air Force and Army relating to Army organic aviation was signed upon Nov. 4, 1952 and still is in effect. The memorandum states in part:

"Army organic aviation will consist of aircraft directly related to the Army within the Army combat zone as an integral part of its component for the purpose of supporting the improving ground combat and logistical procedures, subject, however, to the limitation that such aircraft will not duplicate the functions of the U.S. Air Force in providing the Army, by land wing and rotary wing type aircraft, close combat support, assault transport and other troop carrier tasks, aerial photography, medical evacuation and introduction of enemy land power and communications."

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ARMY'S CORPORAL MITTER (left) and Harold John Mitter (right) ready for simulated surgery in Sagebrush maneuvers.

after 5 a.m. and went told to stand by for a trip to the airstrip where the 500 casualties would be shifted from helicopter into the C-123.

At 5:30 a.m., they were advised to get on any truck, then report to the field hospital. A C-123 was ready and loaded with wounded of noon. Fifteen minutes later the pilot cleared the base and went back close to his base.

Only explanation available during these six hours of delay following the simulated blast was that the Army had not called upon the Air Force to perform the mission, a necessary military preliminary to the exercise.

There was no more news and no more action at 9 p.m. the regular evening press briefing was held. An Army press officer reported on the day's ground action. He suggested a rider slow for attempted reporter. It was that an Army sergeant who that day had won a commendation.

The sergeant's achievement: He had constructed a beautiful simulated casualty in the field. It was complete with rows of white crosses, each with a name and serial number. There was even an impressive flagpole.

An Air Force officer told the briefing

the scheduled medical evacuation of 800 persons had been cancelled because no courier at the base news asked that all the soldiers were dead.

Only Assist Role

This explained why the Army is great enemy of the Eighteenth Air Force was able to win commendation for a good day's work.

It did not explain why USAF was permitted to keep 33 aircraft, come and fight rescue, as well as a fleet of buses, on alert for the color day.

A last shot on the main occasion, debriefed in advance by the Eighteenth, made it clear that the simulated casualties were to be moved. The Army helicopter to the nearest airstrip. Spokesman for the Eighteenth and three assault H-21s were on hand only to assist the Army if needed.

No Army Explosives

This approach clearly was dictated by the Army's acceptance of that mission and requirement that USAF should not operate rotary wing aircraft in the battle zone. Added emphasis is given by the discovery during Sagebrush that Army personnel will not use USAF assault copters.

This was pointed out to Gen. Maxwell D. Taylor, Army Chief of Staff, by Assistant Wince. Could the ground explain why the Army does not use Air Force helicopters on assault missions?

Actual result of this stunt, it was learned, is the Eighteenth has failed to activate new subsonic helicopter units. The possibility that USAF will do so in small units the Army will permit its claims to meet with the USAF ones.

Air Force Paschal

Another memorandum is the report of a major helicopter manufacturer that its public relations department has been instructed in efforts to get pasteurized of Army personnel during in USAF helicopters. Two photographs sent in a morning had returned without persons because available soldiers were not permitted to stage an assault scene with USAF rotary wing equipment.

Army from maneuver headquarters it is possible to get back, however, from some officers of both services. One Army officer, a lieutenant colonel with wide experience in research and development, told Assistant Wince the "Army has a tendency to operate in



AT GUNPOINT, either evolution Air Force, Army relations during Sagebrush. Soldiers are visible helicopters, but he can't see it.



PIASECKI'S TURBO-DRIVEN YH-16A has reached 166 mph, 10 mph faster than the official helicopter speed record set by Sikorsky.

Piasecki YH-16A Does 166 Mph.

Philadelphia—The Piasecki YH-16A has achieved a record of 166 mph on a combination run, according to Piasecki President Don Berlin. This would put the helicopter's official speed 10 mph above that of the Sikorsky YH-16, holder of the official helicopter speed record.

After a 14-minute demonstration flight here, project flight test pilot Harold Peterson told Army News that the large "Twin-Turbo-prop" helicopter, with flying qualities more similar to those of fixed-wing craft, than smaller helicopters. He has logged 29 hr in the turbine-driven machine and 50 hr in the earlier piston YH-16.

The power margin of the turbine's two Allison XT-15 turboprops shows more positive engine performance than Army Avionics' Maj Gen. Blighden Hovest, the only passenger on the demonstration flight, and the vibration level, which was greater on lower and just before touchdown, which change, seemed to be much lower than that of the piston-powered YH-16.

The maximum instrument indicated rate of climb noticed by Hovest was a maximum 3,500 fpm, as the helicopter went into a steep gradient climb out. Greatest forward velocity noted was 130 mph. The craft was 3,600 ft under gross loading conditions, however, since hovering would have interfered with the gross run that followed the flight.

Despite much early concern over the large size of the helicopter, few bugs have developed which can be blamed on this factor, according to Joe Koch, project flight test engineer.

Knowledge Not Enough to Maintain Superiority

New York—Superior technical knowledge is still not available to the U. S. to maintain leadership in the development and use of new weapons, George B. Metcalf, general manager of General Electric Co.'s Special Electronics Projects Department, warned last week at the 17th annual meeting of the American Ordnance Society.

The key to leadership, he said, lies in our ability "to recognize, define and apply our technological knowledge."

Metcalf pointed out that while weapons are growing more complex, their development periods and their lives in deplete combat are now getting shorter.

He added:

"It is not what we know, but what we have reduced to practice that counts in the final run. If our resources are able to do this faster and better than we, we are certain, but, even though we have superior technological knowledge."

The international ballistic missile-hopping trend now seen of science and technology, seemingly

complexities decrease for the one who gets there first. But for how long?

A few years or a few decades?

Basic new knowledge is being acquired and used at a constantly accelerating rate to establish new systems and products, Metcalf said. To illustrate, he quoted from an extensive military and commercial electronics study recently completed by General Electric. Products introduced before 1960 account for 15% of total present national electronic production. The percentage approximately doubles for each succeeding decade. Based on this study, Metcalf predicted that one third of the electronic products available in 1965 will vanish from technology awareness today. In a like manner, he said, the weapons of the next decade "will be born from technology now regarded and unknown to us today."

The trend to complexity and shorter life spans at present and beyond, Metcalf said, is leading to the fact that "we must identify broadly address ourselves to the knowledge challenge of effectively managing our vast resources of knowledge, talents and facilities to accelerate this trend rather than changing our capacity by stopping."

ADA's Leon H. Campbell, Jr., gold medal was presented during the meeting to Dr. Robert H. Koss, associate director of the Ballistic Research Laboratories, Army Ordnance Proving Ground, for his work on the solution of ballistics and for "developing and expounding the theory governing the flight of rockets, guided missiles and nuclear weapons."



Second Prototype of McDonnell XV-1

Second prototype of the McDonnell XV-1 convertiplane developed for the Army shows major configuration changes over the first plane. Principal change is in the elongated pilot rig, which reduces drag interference between the rotor and the cabin bulk. Skid has been redesigned and the lower rate window has been replaced by a solid panel.

Navion Inventory Sold by Ryan; Third Comeback Seems Assured

A third comeback for the four-engine Navion business plane seems assured by Ryan Aircraft Co.'s disposal of its complete inventory of parts, tooling and parts manufacturing rights to Tabular Service & Engineering Co., of Houston, Tex.

Acquisition of the Navion inventory is the first step in a two-part program in which the Texas firm also plans to acquire the rights from Ryan to produce complete, modernized Navions in single and twin-engine versions, Aviation Week was told.

Manufacture of parts, and later of airplanes, will be handled by a new division of Tabular at Galveston, Tex. The parent firm is an industrial group of companies with interests in aluminum window film, electronic research, oil field equipment inspection services, installation of magnetic-resonance equipment and computer-aided designs for oil field tubular products.

The new Navion activity will be in charge of Lew F. Glick, manager of the company's aviation department. Glick has been in aviation since 1933 and was formerly an engineer with Con-

verse Pt. Worth and Lockheed. He was also active in early administrations of Cessna, Caley, and Vee, one of several current producers of twin-engine Navion conversions.

Immediate Market

Tabular, which began negotiations with Ryan on the Navion project in April, has moved on extensive correspondence with most of Ryan's Navion distribution. These distributors have told Tabular that there is no immediate market for about 300 Navions. The company, however, will complete all plans of its planning before deciding just when it will begin Navion production.

It has begun preliminary engineering to bring the Navion up-to-date. These include oil field equipment inspection services, installation of magnetic-resonance equipment and computer-aided designs for oil field tubular products.

Interchangeability of parts between the single and twin-engine versions will be about 90%, a Tabular spokesman said, to simplify in the field operations. Both versions will use the same power-

plant. Parts standardization will be aided by the extensive tooling supplied by Ryan, sufficient to produce 10 airplanes a day.

Parts Production Priority

Tooling duplication will permit use of one set for the single-engine model and another, with modifications, for the twin, mostly including Tabular's initial capital outlay for production.

Tabular will give priority to making Navion parts. The first tools and spares will be turned from San Diego to Galveston in mid-December. Ryan estimates that approximately 2,000 of the 2,400 Navions built by itself and North American Aviation, from which it acquired the rights in 1947, are still in use by civilian and military agencies.

A source close to Ryan estimates that the company's Navion parts may have been approximately \$210,000 a year since it ceased production of the plane at the outbreak of the Korean war to concentrate on more urgent military projects.

Ryan spokesmen emphasize that the transaction does not signal the company's intention to close the door on commercial aircraft development. It is known to have a number of aircraft projects in the engineering stage for civilian airplanes, including a proposal for a turbine-powered corporate transport.



FINAL ASSEMBLY DIVISION of Boeing Wichita which rolled out its first production B-52 last week.

Wichita Rolls Out First Boeing B-52D

Wichita, Kan.—The Boeing plant here last week rolled out its first production B-52 intercontinental bomber.

The aircraft has been designated the B-52D. This model has a gross weight of 460,000 lb., compared with a 350,000-lb. gross weight for the B-52A model. The B-52D is also equipped with larger drop tanks. Boeing says the new model demonstrates the "growth" potential designed into the B-52.

The B-52C is in production at the present time at Boeing's Wichita, Wash., plant.

James H. Douglas, Under Secretary of the Air Force, praised Boeing's record of military aircraft production at the rollout ceremony.

The Under Secretary added: "Whether we like it or not, the central facts of military power today are atomic weapons and air. It is impossible to have the capability of delivering such weapons."

The B-52 is just back as aircraft. For 1955—and for a few years to come—it represents a pinnacle of achievement in engineering, in electronics and in performance."

Boeing reported that 2,619 subsonic fighters and suppliers are taking part in the B-52 production program. More than 570 million in orders for B-52

parts have been placed with outside manufacturers.

Portland, Ore., last week announced that it had been awarded a multi-million dollar contract by Boeing to produce engine fuselage sections as well as wing panels and vertical tail fin.

Titanium Order Lead Time Set at 3 Months

A three-month lead time for titanium orders has been established by the Bureau and Defense Services Administration.

The new order gross supplies 80 days to most defense steel orders placed after Dec. 8, 1955.

The DESSA order is designed to give suppliers sufficient time to fill increased orders for titanium will pool into inventory from increased military demands in 1956.

The Bureau points out that aircraft manufacturers of not allowing suppliers enough time to produce a quality product has often resulted in reworking of orders after an initial failure to produce high quality material, according to DESSA.

The agency says it expects several benefits from the new policy, including lower production costs for titanium products and eventually a reduction in price.

The lead time is expected to allow grouping of small orders to reduce

the number of mill setup changes.

It is also supposed to allow more intelligent planning, cut the number of rescheduled orders and provide the most efficient use of existing capacity, according to DESSA.

Ramsey is Re-Elected President of AIA

Deloitte C. Ramsey and Edwin D. Webb were re-elected as president and vice president respectively of the Aircraft Industries Assn., at the winter meeting of the association's board of governors in Phoenix, Ariz.

G. W. LaFayette, vice president in charge of General Electric Co.'s Atomic Energy and Defense Products Group, was elected chairman of AIA's board of governors for the first six months of 1956. Joseph T. McNamara, General product, will serve as chairman of the group for the last half of 1956. Members of the executive committee include Malcolm P. Ferguson, president of Boeing Aerospace, Whitley G. Collins, president of Northrop Aircraft, Ramsey, LaFayette and McNamara.

George M. Baskin, president of the Glenn L. Martin Co., is the new chairman of the Finance committee. He G. Elder, vice president of Hughes Aircraft, and T. Claude Ryan, president of Ryan Aeronautical Co., are the other members of the committee.

Ramsey Board was re-elected secretary-treasurer.



Rheem

GOVERNMENT PRODUCTS DIVISION

Just as he held, firm signature of John Hancock signified full acceptance of the responsibilities contained in the Declaration of Independence, so does the Rheem signature, as a prime or sub-contractor, signify full responsibility for every commitment to the most intense demand.

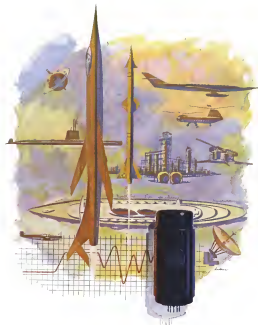
In every operation, from preliminary research through precise engineering to quality controlled production, responsibility is a need that is Rheem and is the key factor in Rheem's enviable record of low per-unit cost and on-time completion schedules.

The Government Products Division facilities of Rheem are presently in quality development and production on air frames, engine and propeller components, subsonic ordnance, electronics and ordnance material.



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IN MINIATURE

RATE GYRO DESIGN



Even Aerocor in a degree—highly only a point measure only 100 to 150 and sometimes and several hours of use in 10-15 per cent more.

"It's broader" because the horizontal component is the greatest (in some cases) and the vertical is the least (in some cases) and the vertical is the least (in some cases) and the vertical is the least (in some cases).

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Finnair Negotiations Highlight Headaches of Flying into Moscow

Helsinki—Agreements being concluded for operation of an air route to Moscow by Finnair point up the many problems confronting those foreign airlines who hope someday to serve the Russian capital.

Fuel, maintenance and maintenance costs within Russia are different (or located) from those available within western countries.

Soviet commercial aircraft fly on jet fuel. The Conquest 140s and 140s which Finnair proposes to fly on its Moscow route require 100-120 octane. Thus, the planes will have to carry enough fuel for the return flight at a cost in pay load or transport fuel involved in Moscow, an expensive proposition.

Finnair also will have to place a CW operator trained in the Russian "style" on its aircraft for communication.

Indications are that the Russians will allow Finnair to station only one airplane at Moscow at urban airports. This probably will mean flying in an airplane on each flight, again decreasing passenger payload.

Aircraft Exports

In September, exports of civil aircraft weighed in at \$3,000,000, according to the Aircraft Industries Association of America. During the first nine months of the year, a total of 475 such units (\$5,000,000 worth) was exported. Comparisons reported September ship yards were the Aero Design & En-

Military Aviation Funds (Fiscal Quarter Ended 1955)

The three military services had an unobligated balance of about \$15 billion for gas contracts for aircraft and related aircraft equipment on Oct. 1. The unobligated balance was more than \$10 billion.

Here are details on procurement obligations and expenditures for the last quarter of Fiscal 1955 selected by the Department of Defense.

	OBLIGATIONS (\$000 Omitted)		EXPENDITURES (\$000 Omitted)	
	July, September	Unobligated Balance, Oct. 1, 1955	July, September	Unobligated Balance, Oct. 1, 1955
Army, Engineers and Parks				
Army	—84,851	270,978	57,288	416,798
Engineers	—50,549	3,000,000	3,000,000	3,000,000
Parks	—91,438	5,125,551	1,313,654	14,813,654
MDAF	—7,710	—	—	—
TOTAL	79,806	13,395,514	1,717,242	10,800,352
Naval Forces				
Army	154,075	335,877	15,265	512,229
Naval	50,648	375,241	30,465	514,641
MDAF	21,408	1,000,281	118,277	1,440,271
TOTAL	186,131	1,687,578	114,294	5,017,141
Department of Defense				
Army	7,474	328,400	15,477	564,479
Naval	18,608	183,818	22,254	510,481
MDAF	11,616	814,573	18,181	1,440,785
TOTAL	37,698	1,326,791	55,912	1,515,745

For further information, contact with Gary, Jr., General Deputy Director, General Staff, Washington.

LEAR

Here is one of a series of advertisements we are running in FORTUNE and BUSINESS WEEK to acquaint company managers with our interest and our experience in the field of automation and data-processing.

We believe we are making good progress in developing activities that should ultimately give us a strong position in the tremendously important and rapidly growing field of automation.

Problems are available for consultants and engineers in these fields of interest activities:

Executive Data Systems Development

Integrated Computer Development

Control and Control Systems Development

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The digital control room of the Ramo-Woodridge Data Processing Center

BUSINESS AUTOMATION and MILITARY ELECTRONICS

The problem confronting many company managers today in dealing with automation is how to apply the new techniques of automation and data processing to the problems faced in areas such as the transfer of our military equipment to emerging for efficient operation of the new powerful tools of electronics to the art of war.

At Ramo-Woodridge the difficult demands of major military programs responsibility have been met successfully by the placing of heavy investments upon teams of naturally well-equipped, trained and experienced scientists, operational procedures experts, and engineers. These teams deal with the technical and non-technical portions of a project as inseparable and interrelated aspects of a single problem.

Similarly, work has been done in the last two years by this company to represent problems of automation drawn from such diverse fields as manufacturing, banking, transportation and public safety. The results strongly suggest the conclusion that many of the difficult problems in automation that first business and military today can be economically solved by teams that include a breadth of technical and non-technical competence which permits them to consider a highly diverse, scientific analysis of a client's operations and requirements.

One important advantage to the client of such a broad and objective approach to his problems is the possibility of streamlining the entire project. Significant results can be obtained without the necessity for movement to new additional facilities or equipment. Meanwhile, the technical staff of The Ramo-Woodridge Corporation, provided by its thousands of scientists and engineers, is such that it can also undertake successfully the development of entirely new equipment and techniques, if required. As an example, major programs are currently under way on the development of an advanced type of digital computer and control system, and on the automation of large-scale data processing activities.

As a naturally great concern, military electronic equipment has shown the cause for non-military automation. A major objective of The Ramo-Woodridge Corporation is to assist business and industry in making rapidly, yet intelligently and economically, to take advantage of the great benefits of the new techniques.



The Ramo-Woodridge Corporation

3635 BELLEVUE AVENUE • LOS ANGELES 44 • CALIF.



The Ramo-Woodridge Laboratory staff works in a State-of-the-Art facility, as depicted in the adjacent photograph, to solve your problems.

MAJOR EQUIPMENT, including a laboratory devoted to the development and maintenance of advanced types of communication devices such as radar and electronic systems, is the focus of the Ramo-Woodridge Laboratory.

gearing Co., Bosch Aircraft Corp., Cassin Aircraft Co., Piper Aircraft and Taylorcraft, Inc.

National Mail Rate Disallows Strike Cost

National Airlines' cost per jet per month has been set at \$4,112,442 by the Civil Aeronautics Board.

National has been ordered to show cause why the rate shouldn't be made fixed.

Under its terms, the airline will have to submit approximately \$900,000 to the Post Office Department.

The rate proposed by CAB covers the period July 14, 1947, to Jan. 14, 1948, for domestic operations, and Jan. 15, 1948, to Dec. 31, 1951, for the other system, including domestic and international operations.

The rate includes fuel costs, cost of \$1,303,151, an average of \$1,710,591 and payments for federal income taxes of \$2,148,440.

In establishing the rate, the CAB stated that the operations of National Airlines had given satisfactory service the last two and a half years period.

The study part of the period was ended by the grounding of the new DC-6 and by a ten month pilot strike which caused a substantial need for subsidy.

The Board noted also that the airline made steady progress from that point, becoming free of subsidy Jan. 1, 1952.

The Board has decided to allow costs amounting to \$575,000 which was worked in the DC-6 grounding in figuring the real rate. Costs of about \$400,000 which resulted from the National pilot strike were also classified as operating the rate. This conclusion follows a Board policy expressed recently in the transatlantic line rate rate set in accordance to a Trans World Airlines pilot strike.

Capital Pilots in Radioactivity Tests

Capital Airlines pilots flying out of Knoxville, Tenn., are cooperating with the Atomic Energy Commission's Oak Ridge Laboratory now doing a test to determine the amount of exposure of pilots to radioactivity when carrying shipments of radioactive materials.

Each crew member is being fitted to carry a small packet of film in his shirt pocket which is returned to Oak Ridge in processing at the end of the trip. Objective of test is to ascertain safety of general handling in radioactive shipments and the possibility of using such facilities.

airborne bugs come down-to-earth

THROUGH DAVIES MAGNETIC TAPE EQUIPMENT FOR RECORDING, REPRODUCING, AND ANALYZING DATA

Whether it be shock, velocity, acceleration, or vibration . . . temperature, flow, pressure, or force . . . voltage, noise, or power—here's the equipment that can find the "bugs" when everything else fails. Install it in the aircraft under test. Let it record hundreds of functions simultaneously. Then reproduce them in the laboratory anytime afterwards just as they originally occurred. Save them in this compact tape form for as long as you like. Whenever you want to reproduce them again, you'll find the signals just as true as the originals.

Davies Laboratories, as the planner in airborne applications of magnetic tapes, has a full line of flight tested data handling systems and equipment. Write for details on these that answer you, or just tell us about your data handling problem. You'll find our engineers ready to draw upon a wealth of experience to help you reach an ideal solution.

- **PORTABLE RECORDERS**—Write for Bulletin 34-D and 34-E
- **LABORATORY RECORDERS AND REPRODUCERS**—Write for Bulletin 34-D
- **AUTOMATIC WAVE ANALYZER**—Write for Bulletin 34-C
- **SPECIAL EQUIPMENT**—Recording oscilloscopes (Bulletin 34-D and 120) crystal oscilloscopes (Bulletin 104 and 107) FM Oscilloscopes (Bulletin 105, 106, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

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DISASSEMBLING H-21, fuselage is divided into sections



ROTOR OFF, forward section goes into wide mouth of C-124



BELLY WHEELS are built to fit tracks leading into Douglas transport



HELICOPTER, 15-ft high, enters C-124

TAIL SECTION, with soldiers mounted, enters transport one end first. The engine is in this hold



ASSEMBLED at a distant point, H-21s that have been loaded to the cargo net by Globemaster H-21B troops in flight

Globemaster Increases H-21B Range

SEWARY AFB, TENN.—The ease with which a Focke C-124B Web Horse helicopter can be dismantled and transported over long distances by the Douglas C-124 Globemaster was demonstrated here recently by the Eighth Air Force's 514th Troop Carrier Group.

No aerial crane or other heavy equipment is needed for the operation, which, as Air Force spokesmen said, allows H-21B squadrons to be flown "to any point in the world."

In a recent test, the helicopter was

shut down a C-124 and loaded for its short section five hours after the start. In eight hours, it had been unloaded, reassembled and was flying again.

Disassembly includes removal of rotor blades, a short drive shaft and quick disconnects in the electrical system, fuel lines and control cables. The two turbine engines are mounted on skids to facilitate loading and unloading.

The H-21 weighs 5,600 lb, empty and is in service with the USAF, U. S. Army and the Royal Canadian Air Force.



H-21 departs its troops. C-124s provide the aerial lift that put the H-21s in the point where, and when, it was needed most.



9 reasons why the aviation industry depends on Johns-Manville Goetze Gaskets

Highly skilled and experienced tool and die-makers provide the precise workmanship that assures superior gasket performance.

J-M Goetze metal gaskets consistently maintain a tight seal despite the wear and wear exposure conditions found in modern aircraft. Bearing with the superb craftsmanship of J-M tool and die-makers, Johns-Manville follows through each step of production with the most modern methods of manufacturing and quality control.

As a result, the 46 million gaskets produced by J-M each year are superior

pieces of precision, and accuracy. This means not only better performance in flight, but is frequently an important factor in the safety and comfort of the crew.

Let Johns-Manville gasket experts solve your sealing problems. J-M technicians will work directly with your own engineers to develop new gaskets—or adapt existing styles—to meet your specific needs, no matter how technical. Write today for further information on Johns-Manville Goetze Gaskets and other products for aviation. Ask for Brochure AV-1A. Address: Johns-Manville, Box 64, New York 24, N. Y. In Canada, Fort Greff, Ontario.



Manville's mastery of J-M Goetze Gaskets is revealed by expert job technicians working with modern equipment.

THERE'S A J-M GASKET FOR EVERY SEALING PROBLEM



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Metal

Screen

French
Type

Single
Bead

Mach
Filed

Non-
Metallic



Johns-Manville

PRODUCTS FOR THE AVIATION INDUSTRY

MANAGEMENT



ALLISON'S 501-D13 and five turboprop engines will power American Airlines' fleet of Lockheed Electra transports.

With Top-Level GM Backing:

Allison Moves to Boost Its Airline Sales

By Robert Hur

Indianapolis—Strong performance and performance guarantees, an active technical development program and top-level executives looking for holding the commercial turboprop engine and propeller sales drive of the Allison division of General Motors Corp.

General Motors entry into the post-war airline market began with the recent sale of the Allison Model 501-D13 and five turboprop engine rated at 3,714 hp with the Aeroflight Model 196A four-blade propeller to American Airlines for its fleet of Lockheed Electra transports. With Lockheed estimating a potential demand for 800 Electras, plus commercial cargo versions of the Boeing C-130 military transport, Allison is organizing a sales campaign backed by technical support to capture this segment of the airline gas turbine market.

Details of the sales, service and development policies applied in Allison's entry into the airline business were revealed in an exclusive interview

with executives at top airline executives including E. B. Norrell, General Motors vice president and Allison general manager, Harold Dow, assistant general manager, Dorothea Condon, engineering director, and John Peters, chief engineer for the turboprop program.

GM Backing

Significant factor in Allison's penetration of the commercial gas turbine market is the top-level backing of General Motors Corp. Allison has extensive experience in Allison's permanent interest in commercial aviation and whether the corporation would allocate the division sufficient resources to sustain a commercial program have been largely depleted by recent corporate action and the personal participation of General Motors president Harold M. Dodge in airline negotiations. Knowledge of Dodge's push to the airlines is

General Motors is going to hold the program close held in high water." Reinforcing this statement are the

recent investment of corporation funds in research, development and test facilities and in programs for both gas turbine engines and propellers. Another



GM'S CUSTICE—Close hold on high water."

How Fenwal Heater and Ventilating Controls Assure Safety and Comfort on the DC-7



1. A SAFE, COMFORTABLE RIDE is assured on this globe-piloting Douglas DC-7. Fenwal THERMOSTATIC Heater and Ventilating Controls maintain a steady, comfortable temperature in passenger and crew cabins. Compact, highly resistant to shock and vibration, Fenwal thermostatic units assure the highest temperature control requirements considered over the far-flung Douglas service routes.



2. THESE HEATER CONTROLS and the rate-of-air TEMPERATURE unit located in the slender duct of the main cabin duct assure maximum comfort and safety. Perfect approach visibility made possible by dependable windshield anti-icing control is also assured by the dynamic Fenwal operating principle.



3. ANGLEWISE HEATER OF THE DC-7, shown here, is equipped with primary and secondary cycling and overheat THERMOSTATIC units. Perfect functioning of engine control systems in the heat of view temperature control directly incorporated in the test system despite stringent environmental and operational conditions.



4. THE FENWAL HEATER CONTROL DEVICE (shown here) controls for all types of aircraft. The open shaft is the temperature-sensitive element that actuates the logical controls. The control "piston" is actuated by the air mass. View for complete details, Fenwal Headquarters, Airfield Products Division, 1514 Pioneer Street, Acton, Massachusetts.

Fenwal Controls Temperature . . . Precisely



MODEL 381's military counterpart, the T50, will have two gun ports on the C-130 before 501 enters its active program.

factor in the formulation of a strong national aviation policy affecting all American aircraft and Aero products. Aviation equipment in transport applications.

The commercial turbo-prop program is included in the 163 million allocated for gas turbine engine development and test facilities (AIA Nov. 7, p. 32) and the 550 million earmarked in the first installment of an engine development program at Allison's Indianapolis plant.

General Motors already has spent \$24 million of its own funds at Dayton on development of the Aero products steel hollow blade propeller capable of absorbing up to 4,500 shaft horsepower in a gas turbine engine.

Allison also has been told of the Model 501-D15, an advanced version of the Model 501-D15 under development. The Model 501-D15 is aimed at over 4,000 shaft and is scheduled to boost EPRs engine speed by 75 mph. Be noted that, Allison is working on the Model 550, a split compressor turbo-prop of even higher power and lower fuel consumption.

Allison Service Policy
Allison's after service policy includes:

- Guaranteed altitude performance for the Model 501 and a guaranteed maximum of performance deterioration during its service life.
- Guaranteed maintenance cost per hour by both engine and propeller. This guaranteed price includes labor and material and remains in force whether maintenance is performed by

Allison or in airline shops. Allison will pay the full airframe maintenance cost as either an engine or propeller that exceeds the guaranteed level during the first two years of service.

• Adjustable constant materials of 625 lb for the Model 501 engine and 1,000 lb for the Model 501A propeller on initial airline service. Allison expects to boost the Model 501 overhead to 1,500 lb within a year after airline service begins.

• Constant propeller blade and hub life of 10,000 hr against fatigue and abrasion on the Model 501A. Aero products recommends blade and hub inspection after 10,000 hr and will offer parts that pass the 10,000 hr inspection.

• Cheap conversion to advanced methods of the commercial turbo-prop using technology on-hand stock. It expects the larger Allison with heavy investments in modern manufacturing facilities will want to overhaul their own gas turbine engines and propellers. Allison, however, looks upon smaller airlines as good prospects for better overhaul work at Indianapolis and in allocating facilities to handle this anticipated business. Allison expresses its purpose for advantage in doing better service of doing the early airline service life of the Model 501 because it will enable them to locate mechanical problems and parts of lower endurance and crack

in less than the production line and in field maintenance.

Field service with the engine will be handled by the Allison and Aero products Service Divisions that now serve the military. Special service teams will be organized for each airline that puts the 501 into operation, and a new field service office will be established in New York in handle for maintenance of engines in that area.

Allison is also working to accommodate a large backlog of flight operating experience on both the Model 501 engine and the Model 501A propeller to air side airline operations. A 1,500 lb test unit is being conducted on the engine propeller combination in an Electron-type nacelle at Allison's Indianapolis flight test facility.

This test is being conducted according to typical American, British, French and TWA test schedules with engine running time on ground, take-off power, climb, cruise and descent.

More valuable flight experience on the YF35 (an early military version of the basic Model 501 design) and a three-bladed Aero products propeller is being obtained from two General Electric YF35s operated by the Military Air Transport Command.

A C-130 equipped with Aero products propeller is scheduled for flight test early next year.

Development of the commercial propeller began in July, 1953, and several 150 hr service qualification tests have been passed in Aero products model manufacturing of all the additional safety features of the commercial



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Decker Aviation Corporation
101 Franklin Ave., Philadelphia 19, Pa.



propeller. Civil Aeronautics Admin-
istration issued a commercial type
certificate for the 15 ft. Model model
last September.

Tested Turboprop for Airlines

Three test converted Cessna 440s
have a total of 5,530 hr flight time.
Some spectacular performances of 23
hr and 21 hr flight time were made
with each aircraft during a 24 hr
period. Both these TC-131Cs also
flew 10 to 14 hr on the days before
and after the endurance runs.

The two TC-131Cs averaged six hr
daily utilization during August, eight
hr during July and reached a seven-
hour average in September.

The TSE design now has 13,600 hr
of test cell running plus 3,800 hr of
flight time on the TC-131C and the C-130
and is R-17 and General Electric flying
test rigs. Allison is counting on opera-
tional experience from at least two
years of military operations with the
T56 on the C-130 as an aid to its
entry into airline service. The T56
will have nearly 100,000 hr of flight
test before it enters an airline turbo-
prop passenger. Allison believes it
can easily reduce this interval between
military and commercial operations to
one year for both turboprop develop-
ments.

Allison is currently showing a com-
plete power package with its Model
561 engaging the Arrandale Model
1964 propeller and the Avco Aero-
dynamic Industries that can prove at-
tractive to the commercial market.
Allison is also trying hard to sell the
Arrandale propeller to the Air Force
as an replacement for the C-130
electronic propeller now on the Lockheed
C-130 Hercules.

"Best Job For Defense"

The new attitude of General Motors
Corp. towards its Allison division
regards a defense policy shift that
began early in 1951 as it became re-
alized that the Korean war was nearing
an end. Board Chairman Alfred P.
Sloan assembled top General Motors
executives for a lunch at the Waldorf-
Astoria in New York in January, 1955,
and laid down the new policy.

He said, in effect: "This is going to
be a substantial defense industry in
this country during the lifespan of
everybody present here, and some of
you are pretty young men. General
Motors must play a vital role in this
industry, and it must gain the same
leadership in whatever part of the de-
fense industry it tackles that it has in
the automotive industry. It is now
your job to determine what General Motors
is best fitted to do in the personnel,
design, materials and how we can sta-
bilize leadership."



E. B. NEWELL probes Allison's drive.

Allison executives returned from
that meeting and immediately spent
six months with Air Force, Navy and
airlines representatives conducting a
market survey of the aircraft engine
field to determine power requirements
from 1956 through 2004. From that
survey Allison prepared a gas turbine
development program that was pre-
sented to and approved by the Gen-
eral Motors engineering policy com-
mittee in July, 1954. This approval
carried with it \$10 million in corporate
funds for Allison to begin its engine
development program built around two
turboprop designs and one turboprop
project.

Sell More Power

The development program has since
been expanded to include supersonic
turbojets with more than twice the
power of present engines and atomic
powerplants. Much corporate funds
will be provided for still further re-
search and development. In general,
Allison's development philosophy is
based to a search to split compressor
designs aimed primarily at achieving
the lowest possible fuel economy for
the necessary power output. Newell
Dodge told Aviation Week:

"Immediately after the Engineering
Committee approval of our develop-
ment program we started a feasibility
study. It was obvious that there were
no facilities here and one flew in the
world that could test the kind of en-
gines we were talking about. We
decided that feasibility study in Decem-
ber, 1954 and early the next February
Mr. Newell and some of the rest of
us presented that proposal to our en-
gineering Policy Committee in De-
cember."

"That proposal amounted to \$65
million for facilities to be located here
at Allison. It was strictly for develop-

ment and testing—no manufacturing
facilities whatsoever. We recommended
that this be financed with General
Motors money. It was approved and
went through the other necessary com-
mittees, including the financial com-
mittee, and got final approval on
March 7, 1955.

"This is an entirely different con-
cept of what Allison and General
Motors have had in the past. It is an
opinion that one of the main things
that is wrong—and one of the main
reasons engine development has been
hindered in this country—is that there
has never been a significant estab-
lished for an engine prior to the
equipment for an airplane. Since it
takes longer to develop an engine than
an airplane, the engine maker is at
least two years behind before he begins."

"We realize and understood that
we are taking a possible business we may
put money into an engine for which
there may never be a requirement. But
we really believe that an engine avail-
able is a lot better than one that is not
available and we think the guy who
has it available is going to sell more
of it. And we think the fact that it
is two years along and figured that
for doing will mean there is a dog
gone good chance that he is going to
get it paid for."

Lacking adequate test and develop-
ment facilities for high-powered turbo-
jets such as its 13,000 lb. thrust JT7,
after a 1951 employee received no
test cells and failed eight times, Allison
had to depend on getting engine test
time in Government facilities. Al-
lison executives feel that dependence on
Government and other facilities, in-
volvement in using Government facilities
plus an additional time penalty as an
individual manufacturer.

"Why are we willing to take that
kind of a risk on a feasibility study and
I think the best example is the feasi-
bility we are now handling—a \$15 mil-
lion facility built financed by the Gov-
ernment and half by General Motors.
We have accepted our part of it for a
year, but we just started three
months ago to build the Government
part of it."

For the Government financial facil-
ity, first of all it takes 13 to 18 months
of red tape to get somebody to de-
cide whether they are going to do it
and then X amount of time to decide
what the specifications are going to be
and another six to eight months to
get the contract straightened out.

"Well if we are going ahead and
try to get up two or three years in
developing the product, we certainly
cannot be there until we have a
facility that does not exist. We have
to get to make that facility meet the de-
signs we are going to be ready for it."



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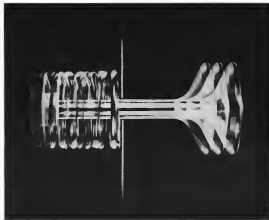
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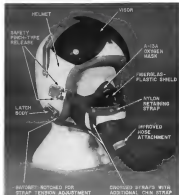
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FOGPOOF STRAP arrangement to keep helmet and oxygen mask in place during bailout

high-deg performance on the side.

An access port in the lower portion of the face plate allows variation of fingers to close the mask in order to clear the eyes. Inside of port door also supports microphone.

To protect the neck, a nylon cloth skirt extends down from the lower edge of the helmet, far behind under the collar of the flying suit.

Shell of the new helmet is a high strength glass fiber laminated with gelcoat resin. So transparent in color to take care of aspect loads.

Top and back portions of the helmet are padded with 1-in. energy-absorbing foam plastic, a cellular collars, suitable levers or struts.

For head comfort and as a cushion against rearward buckling, a 1-in. layer of foam rubber is used.

The helmet is designed to operate with current oxygen supply system for pressure breathing. It is anticipated that with modifications the helmet could be used as a full-pressure head piece for higher-altitude service.

With all its improvements, the new integrated helmet weighs less than the conventional helmet, voice, and oxygen mask it is intended to replace.

This integrated and evolved from

two earlier prototype designs.

The first was split in both sides and hinged at the top. No rear access port was provided and line area was restricted.

The second prototype had a face plate hinged on only one side. It also had a lower line sight. A larger line area was provided, along with access port.

Meanwhile, pending adoption and production of its integral full-face helmet, Pittsburgh, Inc., has devised a "jet" intended to suppress the vibrations against workload of the helmet and oxygen mask, currently in use.

This jet already has been flight evaluated, and subjected to shock Mach 0.9 to prove vibration characteristics and results have shown the jet to be satisfactory, it is reported.

It consists of a reinforcing Fiberglasment shell over the oxygen mask. Attached to the shell are two straps connected to the sides of the helmet with hook-type adjustable latches. A third strap beneath chin protects oxygen mask from being blown upward. Ingress channels, metal insert, and nylon tubes covering basic hose added to the oxygen hose assembly to prevent separation from the mask during strong winds.

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LETTERS

Another Week informs the opinion of the readers on the content of the magazine's editorial columns. Address letters to the Editor, Aviation Week, 120 W. 40 St., New York 20, N. Y. Try to keep letters under 250 words and give a correct identification. We will not print anonymous letters, but names of writers will be withheld on request.

Noiseless Saucers?

The recent USAF announcement that Area has a contract to build what looks like a "long saucer" (AW, Oct. 11, 1955, p. 14) undoubtedly was very inspiring in part of the article, related to the Council effort on which its opinion is based. This was described in pp. 416-465 of the "Five versions of the Fifth International Congress on Applied Mechanics" (P. van Diering and H. Fries, eds. John Wiley and Sons, N. Y., 1955). One significant application of the Canada Model was the use of a steady cyclic engine motion or vibration. Not only did it silence the aircraft, but the engines were not less than for this discharge conditions.

Take another that the Area saucer will probably be actually silent in operation. The former is a fairly simple all the outstanding processes of the past decades of more obvious, while since 1947 have not only produced the above and performance of the Area saucer but have also been steadily increased on the coming silence of "saucer" in flight.

Lester Duggan
64 Prospect Street
White Plains, New York

Explosives Detector

I was of course shocked to hear of the sabotage of the United Nations search a few weeks ago and read with interest the article in this week's Aviation Week stating that the CIA and F. B. I. are working for a means to detect explosives concealed within luggage—and that matter within any package carried aboard an airplane.

This suggestion for its simple has made to others, but why not do this incorporate small trace quantities of radioactive isotopes as all explosives manufactured in the United States. These could then be detected by a Geiger counter if concealed in luggage or packages.

I am not familiar enough with these isotopes and with radiation as general to give you of the quantities of radioactive material required, but I should think that simple radioactive waste matter is easily available at nominal cost. The level of radiation should not have to be high enough to cause any danger to those who judiciously work with isotopes, since a high-level watch will cause a Geiger counter and emit of as near these all the time.

If the plan could be carried out it would keep the industry in rather an explosion manufactured prior to the implementation of the plan, and there would be no security, or would force him to manufacture



WHAT DO YOU NEED
TO TAKE A
TAILPIPE TEMPERATURE?

FOR ONE THING,
A GOOD HARNESS.



It's tough to take the temperature of a jet's tailpipe. Severe vibration and extreme changes in temperature can wreck measuring equipment. Yet, the information is vital to men who build the engines and fly the planes.

The harness used for the job must be rugged enough to survive brutal operating conditions (even more brutal now that engine thrust and temperatures are being increased).

It has several solutions to the problem, and the rigid, ladder-type harness shown below is one of them. Extender wire is protected from the heat, corrosion, and abrasion by enameled, stainless jackets which are lined with ceramic insulation. Positive and negative conductors are jacketed separately for compactness and ease of installation. Harness can be equipped with open-end or magnetic thermocouples.

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• LETTERS

his own. These obstacles would not deter, he said, a foreign agent who could afford to go to great pains to outwit an aircraft, but would prevent some halfhearted like Carlson from simply purchasing twenty-five sticks of dynamite and putting them aboard a DC-8, just to reflect sentiment on someone.

The method of deterring employers might be useful to other agencies, besides the airlines, who are often sensitive to employers—for instance, the Post Office could also use a system for deterring such firms.

This plan has, of course, many obvious defects. Laminates could, for instance, sufficiently dampen small atoms outside explosive substance. It would probably be difficult to get the explosive industry to agree to the plan, not of less among both manufacturers and most of the explosives that trace quantities of isotopes would change the properties of flame materials, but I believe that in other, more satisfactory solution to the problem of detection is available.

In closing I would like to thank you for your time in reading this letter, and saying keep up the good work at *Amateur Scientist*—you have the most informative magazine in the industry.

John A. Foner
Commercial Pilot ASPL No. 1294612
New York, Michigan

How to Stifle Progress

With regard to your editorial, "Security Status Progress" in October 11: Avarham Wren, the writer is aware of what real type sets can do in the area of security of print a change. The following remarks are therefore made after some reflection:

It is suggested that progress is held by two other factors: namely sufficient distribution of information even when the limits imposed by security regulations and a generally liberalised (conservative is not the correct word) attitude on the part of some aircraft manufacturers.

The video asserts that these are the principal reasons for the limited use of White coats' anti-race rule (they find slavery as unjust to your children).

The distribution of Whitcomb's report was considered in hundreds of copies. Certainly any serious manufacturer able to use the information received at least one copy. It would be interesting to know how many of these copies were listed as con-

pay this without being consulted in an informed manner and have many times the use of the agents' information was effectively vetoed by an executive.

As a case in point, summer flow runoff data has been public property for two years. It is also common knowledge that the U.S. Forest Service had two copies

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UNIT-ASSEMBLY CONSTRUCTION allows self-inspection between to be verified easily. Very simple tightness checks to be made. Because separate connections are eliminated, less maintenance is required. Their outstanding features in low-cost

G-E thermocouples can provide accurate, reliable temperature measurement for every jet engine application.

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G-E SERVO-TEMPERATURE INDICATION SYSTEMS allow the use of easy-to-read reporter indicators. Expandable-scale type indicators have only one pointer, instead of the usual two for more accurate reading. G-E reporter indicators are especially adaptable to the requirements of X-model

indicators where simultaneous readings on both pilot's panel and placard panel are desired. Systems can provide a signal for control surfaces proportional to temperature, true air temperature indication, or for dual indicators. More accurate than millivoltmeter systems, G-E servo-temperature indication systems offer a high-accuracy way to temperature indication.

FOR FURTHER INFORMATION on the G-E thermocouple and servo-temperature indication systems "turn-on" and how they can meet your temperature measurement problems, contact your nearest G-E Representative Sales Office or write Section 385-2, General Electric Company, Schenectady 5, N. Y.



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Defense is also a primary source for the production of commercial electronics. Ask about them.



• LETTERS

and two other engines whose performance fell short of their predecessors might be true, the designers did not or were not allowed to use information which was available to them with no restriction whatever. However, which engine program is not accurate should be concluded, but after a long time and not be involved.

NAVAR WYNNER

Patent-Examiner Need

There is a serious deficit in the processing of patent applications in the U. S. Patent Office because the size of the examining staff has not kept pace with the increased number of patent applications filed. This creates an urgency as to the patent status of new products and processes and tends to this date or delay their adoption by industry and their introduction to the public.

This is a matter that affects your subscribers and advertisers. It can handicap the larger companies and not be related to the individual inventor and the small business whose operations involve almost patented products and processes.

Congress has appropriated additional funds for new patent examiners, but with the growing demand for engineers and scientists in industry it has been impossible to attract enough candidates having the necessary technical qualifications. Because this is becoming a matter of national concern several of the patent law associations have spent in approving the work of the patent office in recruiting new examiners.

There are vacancies in the examining staff which should be filled promptly. This did not appear to you to give the industry publicity, more American Wars and to the technically and scientifically trained people whom the Patent Office is trying to reach.

We feel that the situation is so critical and directly or indirectly affects so many individuals and corporations in the aviation field that you will wish to give the matter publicity.

The immediate openings are for engineers and scientists who can accept appointments as patent examiners. The list and the list contains people and that technical graduates who apply will find the job interesting and challenging and one in which they are likely to close ranks with the latest technical developments. The job also offers opportunities for advancement within the Patent Office.

The salaries for examiners start at \$4,400 a year and it is possible to reach a salary of \$7,700 in five and one-half years. The Patent Office also offers liberal vacations and sick leave and pension benefits.

Engineers and scientists holding a college degree in engineering or applied science or a degree with a major in chemistry or physics or with system considered credits in these fields are eligible for appointment as patent examiners. A list of requirements, open positions in the Commissioner of Patents in Washington.

If you are interested in this job or information or want you to say, please call upon us: Henry E. BAKER, Vice Chairman, New York Patent Law Assn. 151 East 64th Street, New York 17, New York.



OFTEN

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Sometimes a double-headed part or fastener is the LOWEST COST and FASTEST solution to your assembly problem. This special shown to the left is a good example. Painted, machine threaded, center collar stop, large drive head with a slot. Make this any way but cold-headed and it would cost a fortune! But HASSALL made it... FAST and at LOW COST.

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some people think
fuses are cheaper
than circuit breakers

... some people don't

At first glance fuses do look cheaper... but that's not the way many companies are figuring these days.

Company X looked at total cost. Adding the cost of the fuse, fuse holder, power switch and pilot light plus wiring, space and labor cost, they found the one Heinemann circuit breaker performing all these functions had the cost advantage.

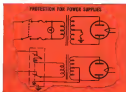
Company Y which formerly used fuses in their equipment had excessive service calls. When they replaced blown fuses with the wrong rating, and the company couldn't take a "braver braver" attitude with its customers, Heinemann circuit breakers ended the problem.

Company Z needed maximum protection with minimum outage time. They needed precise functional ratings to protect sensitive components as well as expected time delay characteristics allowing flash arcback. They also had to have immediate restoration of service following a fault... time was money for their customers. All these qualifications were fulfilled by Heinemann hydraulic-magnetic circuit breakers.

Make your own appraisal yourself. Heinemann circuit breakers may profile you with better protection at a total cost close to fuses. Moreover, by combining functions in a circuit breaker, you may have a cost advantage.

Send for the **Circuit Breaker Engineering Guide**, Bulletin 301.

Heinemann
Aircraft Type
Circuit Breaker



Typical full wave power supply with both primary and secondary circuits protected. Lower circuit shows one circuit breaker replacing fuses, fuse, switch and pilot light.

HEINEMANN

ELECTRIC COMPANY
152 Pike Street, Trenton 2, N.J.

Circuit breakers



AVIONICS

North American Gears for Avionics Drive

By Philip J. Kline

Dormer, Calif.—The established avionics industry, already concerned about avionics manufacturers' entry into the avionics field, can look forward to even more aggressive competition from North American Avionics.

This is the most significant acquisition of NAA's recent entry to combine its Eldec Mechanical Engineering and its ESI Manufacturing Department into a single integrated avionics enterprise under the Avionics Division (AW Div. 24, p. 15).

The new division now employs over 8,000 on an increase of 60% from a year ago. Of this number approximately 1,000 are professional engineers and scientists; a group would be used only by Hughes Aircraft Co. in the avionics field.

Although NAA officials decline to estimate Avionics Division sales revenues before the new division will do about \$60-80 million this year.

The Avionics Division is now concentrating on:

- Control systems
- Autopilot for control
- Automatic flight control
- Digital computers and data processing systems
- Precision motion mechanisms, including airborne controls for nuclear tests

Formation of the Avionics Division follows closely on the heels of NAA's similar action in setting up its Avionics Industrial Division to handle its under-achiever and its Perfectone Division to handle market programs. The new Avionics and Avionics Division, together with the Avionics group which is responsible for the Navajo and other NAA mobile programs, formerly made up the company's MACE (Mobile and Control Equipment) operation.

What It Means

The North American, and its avionic industry competitors, the new Avionics Division has the following advantages:

- Greater breadth of experience. The more breadth exists it would be easier for the new division to sell services compared to NAA's software capabilities—that is one of its intended objectives.

Despite previous NAA measures to the contrary, at least one major on-line market forced its entry, right



NORTH AMERICAN Avionics has control system for the system being flown in typical of the complex system hardware to be used at NAA's new Avionics Division.



TRANSISTORIZED DIGITAL COMPUTER, under NAA development, weighs only 125 lb.; consumes 150 watts, about 1/10th the power required for its vacuum tube counterpart.



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DIGITAL computer's printed circuit, and with type mechanism still visible showing.

look back to North American airborne people and therefore refused to even consider an intercept for initial studies, charged directly to NAA's Denver group and Italia Corporation of America. Thus, the new organization set up men got some assistance in studies that which have been reluctant to discuss new ideas with NAA's airborne people.

• **Closely knit operation.** Now that state of NAA's airborne people are making the production stage, there is need for close integration of engineering and manufacturing operations. And with an increasing number of projects for other airborne and aerospace companies, there also is need for an application and commercial engineering group. These men will be housed under a single organizational roof and given images.

• **Competitive pricing.** In today's highly competitive market, the difference between overhead rates of two companies may make the difference between the winner and the loser. The new division already is accumulating cost data which will permit it to establish real and true overhead rates covering all its own activities in North America.

Change in Philosophy

The recent NAA action reflects the growing trend in large military defense contractors and reveals a basic change in North American philosophy—approach, two and a half years ago. J. E. Atwood, NAA's president, had Air Force West that his company had no present plans to expand its aerospace activities or facilities beyond those needed to support its own civil and aerospace programs (AW: Feb. 11 1958, p. 40). The EMI Engineering group was set up in the civil space

was seen to meet the needs of the company's newly acquired, North American has said, because no equipment had been developed to achieve accurate guidance and control of missiles over long distances (and) says with aircraft experience had little interest in such studies and virtually no research capacity to spare.

Despite Atwood's disclaimer, John B. Moore, now general manager of the new Aerospace Division indicated to Aviation Week in 1957 that North American had the technical know-how, to become another "Hughes Aircraft" and that he was, however, for management backing to do that job.

In the national view this article appeared, it is clear that NAA top management's philosophy has changed. J. H. Kuchelberger, chairman of the board is:

"The move is the outcome of the growth and continuous progress machine made in the field. The Aerospace Division is developing and producing important equipment for our defense program, as well as automotive devices with commercial potential."

Research and Development

The Automotive Division's engineering department, which Moore headed prior to his recent appointment, now is under Dr. Robert M. Adley. Its activities are broken down approximately as follows:

- 15% supporting NAA's missile programs
- 28% supporting NAA's defense programs

• 57% for other defense customers (In addition to military prime contracts NAA also is working with Space Corporation Co. Randolph Westinghouse Air Arm Division and A. C. Spark Plug.)

The engineering department presently is divided into four research and development sections: with additional supporting and administrative activities.

The R & D sections are:

- **Guidance,** specializing in inertial systems. This section is approached as large as the other three development groups combined.

- **Fire control,** specializing in fighter and interceptor weapons.
- **Fight control,** active in electronic pilot, and deeper systems (airborne systems).
- **Special products,** which handles devices such as airborne target simulators and other equipment which do not fall into one of the three primary categories. This group also develops new supplies and suggests devices.

Recent Developments

Adley's section shows many of the Automotive Division's development

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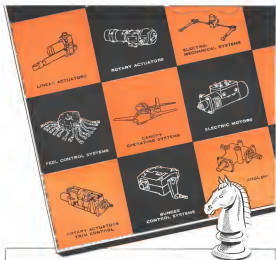
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which are intended for use in inertial systems and/or guidance systems. Several model developments indicate the scope of NAA's avionic capability for complex.

• **Translational Digital Computer.** An alternative digital differential analyzer, developed by the Guidance section's computer group, is the first in the series to undergo flight tests, NAA says. The computer has 95 integrators, total weight only 154 lb, and occupies 3 cu ft less space than a 455.

This is about one-quarter the weight and one-tenth the cost of a non-programmable unit employing vacuum tubes.

Power consumption is only 95 watts, about 1/10th that of its vacuum tube counterpart. The NAA computer employs a 104c rejection rate, has a storage capacity of 20,000 bits and employs 1,000 transistors and 1,500 diodes.

NAA is building both digital computers and general purpose machines, H. R. Brown, head of the computer group, told *Aircraft World*.

• **NGA for inertial systems.** This series, with an 1500s long built in bulk for NATO, employs a North American-modified Hughes radar and NAA-developed computer and control system suitable for a cruise firing interceptor. NAA reportedly is developing a new system for use on a McDonnell Douglas, in which RCA will supply the radar as a NAA subcontractor.

• **Design systems.** The Airborne Division is building the raw design system and in the North American B-108. The Division group led on the autopilot for the F-108 and below its performance was "comparable" to

the Minneapolis/Haworth autopilot which built was selected by the USAF. Below the NAA has chosen the cost of general production experience and facilities.

Expanding Production Facilities

When its new 100,000 sq ft building is completed early next year, the Airborne Division will have a total of approximately 800,000 sq ft of engineering, manufacturing and laboratory facilities.

Under James Fenn, manager of manufacturing the division is going through a major expansion of production facilities.

Although the Airborne Division prefers "to put its talent into systems work rather than components," Airborne is beginning to build out its own systems. Each of its systems involves various and not uncommonly developing special devices, in quantities of one or two, without assurance of future production. As a result, NAA is sometimes forced into component and device development.

This is particularly true in the field of magnetic amplifiers and inertial guidance components.

Representative of division which has come out of NAA's systems work are the following:

• **Minuteman VHF communications set,**

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age \$8.58 gross profit on net sale.
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Corbie's Experience

Corbie's staff, which now numbers over 350, at Puerto Rico is at all levels except for Austin. When the company started in 1952 it interested men, then 100 Puerto Ricans and selected a dozen for its pilot requirement.

"At this point we reach our first milestone," Austin says. "Since most of our employees had no experience in electronics or even in manufacturing, we began by, basically, concentrating everything on training, allowing them just time to tell us, a single strand at a time. The workers rapidly lost interest."

Then in an experiment, Corbie had the opposite picture—helping the men, on their own, assemble the simple electronic equipment and carefully showing them exactly how it was

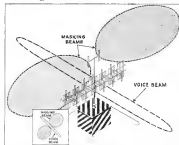
constructed. It worked and this has been the method used ever since," Austin says.

Austin reports that Puerto Ricans realize "positive material material, do, tests and precision and the capable of both long and short production runs from the proper instructions. Also, over this time, interest in their working they comparable material work on yet here."

Indeed, under production, Austin says, a higher than in the early 1950s U. S. on such items. Austin, risk is under 1% with negligible labor turnover, particularly among women.

Austin is made by the island's economic development administration, which that productivity of Puerto Ricans in this industry reaches 90% of the standard level after 10 months. EDA's assistance office in New York, Los Angeles and Chicago to advise U. S. businessmen interested in setting up plants in Puerto Rico.

Portable 'Talking Beacon' Gives Bearing Data Over VHF Receiver



PILOT with VHF receiver can obtain bearing from rotating voice and masking beams.

A portable VHF "talking beacon" passing approach bearing information to aircraft equipped with only a VHF receiver has been developed by Air Associates Inc., of Fitchburg, N. H. Developed with company funds in cooperation with a research agreement, the unit is somewhat similar to the "talking VOR" device designed by Melpar (AW Nov. 29, p. 55).

When a pilot tunes to the new "talking beacon" operating in the 100-150 mc. band, he hears a standard female voice, call out his bearing to the station every 15 seconds. Station bearing is broadcast in segments of 20 degrees, calling the pilot to get his bearing to approximately 10 degrees, in comparison.

The station consists of a four-port-

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types is 30, 600, and 600 respectively, with collector output current of 5, 12 and 16 milliamperes, respectively. Units come with axial leads (for printed circuit and) epoxy stick, one or in conventional transistor socket mounting. Hughes Aircraft Co., Semiconductor Div., Culver City, Calif.

● Silicones solar battery is available in sizes and power ratings of 0.04 to 10.5 sq. in. and 0.2 to 35 milliwatts output (in direct sunlight). Solar current can reach up to 40 ma. and open circuit volt-



ages up to 0.7 v. per cell can be generated in direct sunlight. Radio Shack, 1115 Main Street, Dept. Industrial Radio Corp., Product Information Dept., 1115 Main St., St. Louis, Mo.

Instrumentation

● Pulse code modulation transmitter Model 1 PCM provides a 4-msec bandwidth 1 to 100 cps, for use in digital communications in the 153.175 mc band. Transmitter operates with frequency stability of 0.001% and continuous power in short as low as 0.001 watts or as long as 15 milliwatts. Used for precision far extended operation.

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from 1 in. to 4 in. and has linear output range of 0.2 to 4 in., with hysteresis of 1% to 0.7% over this range. Output is 0.1 to 1 v/in. Moving element under the pressure of an air-bulb design. General Engineering & Research Co., 21652 Melrose St., El Monte, Calif.

Laboratory Equipment

• **Random noise sources**, called Mega Noise, employ fluorescent tubes to provide a calibrated random noise source for microwave frequencies. Noise output is 15 db above 100 to 10,000 cps. Units operate from 117 to 1000 cps. Two models are available covering overlapping portions of the spectrum from 960 to 3,500 mc. Ray Electric Co., 14 Maple Ave., Passaic, N. J.

• **Miniature oscilloscope**, Model MO-24, can simultaneously display 20 traces on a single 21 in. CRT tube. Its intensity resolution is a 5,000-cps meter. Unit has frequency response in-



put to 500 cps. An analyzer unit, called "circuit analyzer" (models 81) and 0.01 second timing lines on scope and integrator, accept data after adaptable delay period following the arrival pulse. Smithwestern Instrument Electronics Co., 2451 Port Oak Road, Houston, Texas.

Servo System Components

• **See 8 inches with guaranteed 7000 mil accuracy** is available in following types: transmitter, control transducer, feedback, potentiometer and deflection. Unit weighs 50 gr., measures 1 in. dia. x 1.24 in. long. Servos are available for 115 v. or 26 v., 400-cps operation, or with 115 v. primary and 90 v. secondary, in transmitter, CTR, and potentiometer. Chilton Precision Products Co., Inc., Chilton Heights, Pa.

• **Magnetic servo amplifiers** are available in one line of units suitable for

use in output stage, to control 400 cps, 2-phase motor systems, including Model M8, T, K, L and three equivalents. Units can be operated at -50°C to 100°C, and come in standard output ratings of 3, 4, 10, 50, and 40 watts. Vreack Instruments & Controls Corp., 1545 West 131st St., Gardena, Calif.

• **Subminiature-type servo amplifiers**, Model 1171, accept two a.c. inputs and one d.c. input in one combination and produce proportional and reasonable power output for control of 115 v., 400-cps servo system rated 15 watts or less. Amplifier has built-in power supply and pre-amplifier. Bulletin 1178-1120-4

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grate application data. Servo Corp. of America, 28-29 Jencks Turnpike, New Hyde Park, L. I., N. Y.

• **Low-level die package amplifiers.** Type RHA551L, push-pull type, is designed to amplify low-level signals from thermocouples, strain gages, thermistor bridges and photo tubes sufficiently to operate an automatic relay or meter. Amplifier has power gain of 60, delivers 5 ma. output with a 500 m. input, and has drift of 1 mV/msec. Temperature rating is -5°C to 55°C. Polytelnic Research & Development Co., Inc., 302 Teller St., Roskilde 1, N. Y.

Components & Devices

* **Wiget** customisable wristlet, Type FT 100, glass sealed, reportedly has stability better than 0.03% per year at 1 atm airtight, which decays to zero at 140C. The 1 atm resistor decays to zero at 100C and has stability of at least

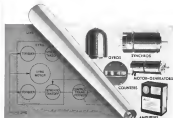


0.1% for 1,000 hours. Resistance values of 1 ohm to 2 megohms are available. Resistor network: $\frac{1}{2}$ in. dia. x $\frac{1}{2}$ in. Puffin Resistor Co., Inc., 3 Whip-poor-St., Morrisown, N.J.

*Precision timing capsules, Model 2078, with a 200 ft. wren drive, provides reliability of 0.002%, manufacture to parts. Ratios and slates are insulated with high strength pink or blue aluminum ceramic rods. Capacitors variations (from 15 mmid to 250 mmid) is approximately linear with accuracy. John and Mary, Cates, Rochester, N. Y.

• **Water-type thermostats** for temperature compensation of bromocresol values are available with high temperature coefficient (up to 7.10 per deg C at room temperature in high resistance value). Units measuring 100 ϕ in square inch have some power capability in older types increasing up to 5 in square, manufacturers say. Gulfon Industries, Inc., Metuchen, N.J.

*Nitrile-glass special cable. Teflon insulated, is available in three standard impedances: 55, 70, and 93 ohms. Cable can be obtained with outer cover.



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(STRUCTURE 1)[illegible]

David the Buddha giving advice to one group of his monks in 1890.



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Norwood Office: 125 W. Broadway Street, Chicago, Ill. South Coast Office: 681 Eastern Bldg., Boston, Mass.
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Strut Assembly—Wing Landing Gear Extension



Pneumatic Door Lock



Gear Box Assembly—Outer Wing Flap Drive



Hydraulic Motor



Spoiler Valve



Valve Assembly—Steering Mechanism



High Speed Fuel Shut Assembly



Gear Box



Fuel Assembly—Surface Power Control

ing of vinyl, nylon, Kelp, Teflon or glass fiber lined. Hitec Wires, Inc., 18 Windsor Ave., Meriden, N. Y.

• **Miniature solenoid**, Model S80123, delivers 40 lb. at 0.02 in. stroke, operating from 15 v. d.c. or 64 lb. from 24 v. d.c. (at ambient temperature of 131°). Over operates over temperature range of -45° to 165°, is designed for continuous duty. Solenoid measures 1 in. dia. x 1 1/2 in. long, has threaded connection. S80 Engineering Co., 4420 Old St., South Gate, Calif.

• **Miniature d.c. power pack**, designed to be wired into equipment circuits much like a power transformer, supplies d.c. for filament, solenoid, relay, photo-cathode or other device requiring direct current in the range of 4 to 500 v., 0.1 to 0.5 amp. Model 5119B operates from 115 v., 60 cps, and provides 25 v. d.c. at 1 amp. with maximum ripple of 1% rms. Voltage regulation from 0.5 to full load is 1%. Model 5114B operates 45-575 in. at chassis space. Other units are available for 400 cps operation. Quad Electric Co., 69 Manor St., New York 2, N. Y.

Production Line Testers

• **Comparison bridge**, Model 283, provides speedy comparison of the magnitude and phase difference of reactance, capacitive and inductive components relative to a resistor standard. Three magnitude comparison ranges are available, 0.1% to 1% and 10% to 100%.



deviation ranges are: 0.1%, 1.5% and 10%. Resistance values up to 20 meg ohms can be accommodated. Phase meters are available for an impedance of operation between 100 cps and 10 Mc. Deviations from 115 v. 50-60 cps. Electro Measurements, Inc., 6117 S. E. Stark St., Portland 15, Ore.

• **Microammeter wallmeter**, with tungsten-type, gamma power measurement of magnetrons and klystrons over frequency range of 0.005 to 9,940 mc., relative accuracy of 1.5%, depending



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RAYTHEON Silicon Power Rectifier

Typical of Raytheon's new approach to old problems is this revolutionary Silicon Power Rectifier. It is superior to ordinary rectifiers in all ways:

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- No failure

This Raytheon "dwarf"—with major applications in military aircraft, guided missiles and in many other areas requiring DC power—is further evidence of Raytheon's "Excellence in Electronics."



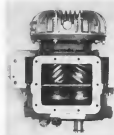
Excellence in Electronics

RAYTHEON MANUFACTURING COMPANY

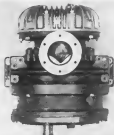
WALTHAM 94, MASSACHUSETTS

Marketing and Sales: Raytheon Systems Inc., 200 Lexington St., Boston 17, Mass.

EQUIPMENT



HELI-MOTOR COMPRESSOR at left shows large air intake and sealed heli-motor inside the housing.



AIR OUTLET, on other side of the combine, shows much smaller opening due to air volume having been compressed.

Stratos to Make Compact, Rotary Positive-Displacement Compressor

By George L. Chastain

Raytheon, Inc., N. Y. is making rotary positive displacement compressors lighter and smaller than comparable machines now in production will be manufactured by the Stratos Division of Eastman Kodak and Raytheon Corp. for use in extreme low-temperature systems. Actual production data will be developed upon the receipt of orders.

The compactness of the heli-motor, screw compressor, which Stratos will manufacture, under license, from the Strathairn Division of Raytheon Co. is being used in the Stratos Division of Eastman Kodak and Raytheon Corp. for use in extreme low-temperature systems.

Stratos has labeled the SRM as the Helix-Rotor compressor. It is a 1.5" diameter Stratos very precise and powerful machine and the first production compressor will be ten to twelve cubic capacity models, a size, used for many existing systems on Raytheon aircraft such as the Douglas DC-7, the Lockheed Electra and Boeing 707.

Not Only For Frost

Although Stratos "officially" plans to build the small SRM compressors for use with frost, the machine is also

used to refrigerate levels itself to at least two other aircraft applications.

• **Cabin de-icing** for very high flying aircraft where it would be required to ice up the aircraft with moist cabin pressurized air. The screw compressor's high "back pressure" prevents any water it will condense in each cycle.

• **Air expansion** machine for cabin de-icing. By recovering the machine—blowing air into the small port, circulating it from the large port and extracting shaft power from the unit can be used as an efficient air cycle device.

Thus, from the Stratos section reports, the Helix-Rotor compressor will be one of the most compact and powerful machines ever made.

Stratos has a wide variety of a few two capacity rotors. The Helix-Rotor is a wide variety of a few two capacity rotors. The Helix-Rotor is a wide variety of a few two capacity rotors. The Helix-Rotor is a wide variety of a few two capacity rotors.

The Stratos screw compressor is a 1.5" diameter Stratos very precise and powerful machine and the first production compressor will be ten to twelve cubic capacity models, a size, used for many existing systems on Raytheon aircraft such as the Douglas DC-7, the Lockheed Electra and Boeing 707.

to 450 lb for compression and drive motor alone.

The DC-7 is more modern, piston-type unit (only one per plane) than the existing system with the cycle failure (for "top off" cooling) weighs 180 lb and runs a 68 lb drive motor—a total weight of 170 lb, but 5.7 tons of refrigerant.

The Stratos package is 160 in. long, 70 in. wide and 6 in. high. Almost three-quarters of the package is taken up by the electric motor.

From 12

One reason for its smallness, when used as a frost compressor, is that it



SCHEMATIC of Stratos' screw compressor.

From the Stoddard-Dayton to the Super Sabre



Speco's creative engineers have opened new horizons in precision!

If you recall the Stoddard-Dayton, then surely you remember the Jeep—the sweetheart of World War I. They were a couple of lads who "gave up together" for our real day airplane. And today their grandchildren are the mainstay of our national economy.

We like to feel that our leadership in precision on a mass production basis has played a big role in this growth. Our track in all industries—automotive, aviation, industrial, . . . in fact, in all fields of

mechanics and hydrology—but made great contributions. Our team of precision engineers, toolmakers and mechanics makes certain that if we fly it . . . it's right! If you have a job with which you feel we might help, a short letter or a telephone call will bring prompt, sound guidance. Or if you'd like the whole story—from plant to people to products, send for our new First Brochure, The Steel Products Engineering Company, Springfield, Ohio.

THE STEEL PRODUCTS ENGINEERING COMPANY



One of our early contributions to aviation—this big cylinder, Ground Pattern Blower Engine produced by Speco in 1934.



Today we're building precision thrusts for today's every model manufacturer of turbo-propelled, winged, after-combustor parts.



MOCK-UP of a piston cap, 840-Kitter compressor (on left) and cylinder master in a single, horizontally-split package. Cap side is at right end of master, side of 115, working valve at 10.

on its face 12 inches from 114 for an equivalent amount of deflected refrigeration, turbine 12 requires 60% less charge than Brown 114 and the work is a smaller compressor. The turbine lines, valves and other system components also are correspondingly smaller and lighter.

Moreover, from 12 is logically more available than 114, since it is used in such common cooling systems as those installed in automobiles and home refrigerating units.

Centrifugal compressors convert air from 12 inches then go to multi-stage construction. These wheel designs become comparatively small and speeds enormously high.

Fits a Gap

Strobo, from cooling system engineer pointed out that the SRM compressor fits a gap between the high pressure, low speed, low volume piston type compressor and the low pressure, high speed, high volume centrifugal type machine.

The new unit can deliver large volumes of air that the piston compressor because it can operate at much higher speeds now, SRM pump parts move in rotary fashion and there is no appreciable friction between parts. The piston machine's parts move with a less efficient compressing motion, and inefficient friction also exists. But the Strobo unit cannot put out the high pressure of a piston compressor.

The new compressor can deliver higher pressures than a single-stage centrifugal machine because of its so-called high pressure side of up to 151. Centrifugal machines have a

head of about 351 for a single stage. Multi-stage units could begin to match the SRM's pressure ratio, but such a machine would be much larger and heavier than the compact SRM compressor, according to Strobo.

Other types of turbine air pumps are:

- **Root-type blowers**, a machine used for large volume, low pressure applications such as other gas conditioning. The blowers have waves cut from inside to outlet port and has an built-in pressure ratio characteristic.
- **Vane-type air pumps**, a low pressure, low speed machine used to inflate devices. Friction between blades and case restricts this type of pump to relatively low operating speeds.

No Surpr

An important advantage of SRM compressors over centrifugal machines is that this unit can start surge.

Surge is the action of centrifugal compressors designed according to Strobo's engineers. Because of this on turbine characteristics—which can cause complete compressor shutdowns—Strobo's engineers have to provide a margin of bypassing a certain percentage of the compressor's output in the surge region. This results in loss of a certain amount of the machine's work, but at in part power and the machine of lives and values to handle the beyond air.

Since the new compressor cannot surge, it has more of this power and weight penalties will at part load, it delivers 100% of volume.

Another feature of the machine is simplicity of control. There is no actual control on the compressor. Devised

CABIN AIR VALVES PASSENGER CONTROLLED

Reg. 124
M1 BC-7



Illustration of the valve and the light panel as installed in a typical passenger aircraft.

WEMAC AIR VALVES provide a wide range of angular adjustments to control air flow in various directions and rates of flow by rotation of valve. Air leakage and weight are held to a minimum. Tested 100%, it is always specification. Made of metal and/or plastic. Flange can be adapted to work as desired with other devices.

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of all the Chandler-Evans Pumps, Fuel Controls, and Accessories, send for your copy of the GECO Circular, "Engineered For The High And The Mighty..." or simply write outlining your fuel control problems. Our engineers will be glad to work with you to help build new standards of performance into your next design project.



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DUAL FUEL PUMP



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GECO's fully integrated facilities are available to carry your project through from concept to finished product. Included are: CREATIVE ENGINEERING — with the talent, knowledge and experience to develop new, finer designs; MANUFACTURING — with the ability to produce components with the extreme accuracy essential to high performance needs; TESTING — more than adequate facilities for fast loading research and rapid final inspection. These are some of the reasons why... wherever progress in the air demands finer, more advanced fuel pumps and controls... you'll find a better answer when you load your problem on Chandler-Evans.

MAIN CONTROL



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Transport Aircraft Pickup Downed Pilots

The All American Engineering Co. has developed a successful land-to-air method of recovering downed pilots from relatively fast-moving aircraft in areas where limited range, lack of speed or accuracy of the cannon precluded the use of the helicopter.

Using conventional and modified arm-let to shoot steel and powered or steel coil pickups, All American worked out a fast, efficient technique that works like this:

A jet aircraft "drop border" the necessary ground equipment (two poles, barbs and cross ropes weighing a total of 60 lb. and packed in a modified baggage

trunk) from the aircraft before the rescue plane is scheduled to arrive.

The downed pilot sets up the equipment as shown in the drawing below and sets firing the path of the approaching aircraft.

Coming in 30 ft. off the ground at a speed of between 150 mph and 180 mph, the aircraft stretches out a wire-guided cable made of nylon and a 74 ft. long pole that makes the initial contact.

When the plane is 50 yards from the ground point, the pilot pulls the aircraft into as steep a climb as possible. The pole strikes the ground craneage and

a hook at the end of the airplane cable grabs the ground cable.

The pole is then drawn back into the aircraft.

The plane, still climbing at a steady rate, picks up the pilot and levels off at about 1,000 ft. After this, the rescue becomes conventional. The rescue simply pulls on the cable and the downed pilot at the end.

Night pick ups have been made successfully and were accomplished without mishap.

Despite the spectacular appearance of the demonstration, All American employees who have taken the role as

the initial pilot of the pick up is considerably less than that experienced in a parachute jump. The role as the aircraft is also said to be comparatively mild.

The total weight of the aircraft gear (bush, pole, cable and a guiding pulley) and is approximately 240 lb. when attached for use.

All American first began experiments with airplane pickups in 1942—pre-technique days—at United States Army Air Force request.

The experiments were continued even after the helicopter's advent because of its special applications.

Eight Subcontracts Announced for B-52

Seattle-Blooming Airplane Co. last week announced the signing of eight new "multi-million-dollar" subcontracts with four firms for B-52 Stratojet components.

With earlier Stratojet subcontracts accounting for 36% (by weight) of each B-52 produced, the new agreements will raise the total to 94%. The subcontracts were made with:

• **Goodrich Aircraft Corp.**, Phoenix, Ariz., for wing strut system, fuselage

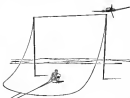
strut, panels, fuel tank assemblies and panels and fuselage subassemblies.

• **Twiss Coach Co.**, Aircraft Division, Buffalo, N. Y., for wing ribs.

• **Firebird Engine and Airplane Corp.**, Aircraft Division, Hagerstown, Md., for fuselage panels and air housing sections.

• **Rolls-Royce Corp.**, Chula Vista, Calif., for turbofans in tail section.

The subcontracts will begin production early next year, with Boeing providing the majority of the tooling. The four firms were selected from 90 companies which competed for the subcontracts.



DOWNED PILOT rigs equipment as shown above and sets firing path of approaching aircraft. In demonstration (below) steel and nylon cable from C-47 pilot pulled off ground. Unit above left was used in early pick ups.



RESCUING AIRCRAFT goes into searchlight climb's seconds before pick up and returns altitude used it reaches 1,000 ft. There, the plane levels off (at right) and maintains low speed while winds with its nylon cable and pulls to the downed rescuee. Despite the spectacular appearance of the rescue, All American Engineering Co. employees who have taken the role say the job and trip up to the plane does not are no more than those experienced during a helicopter pickup.



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North American's Columbus Division is a complete airplane design, developmental and manufacturing organization . . . in full production . . . in Ohio.

To many engineers, this has been particularly good news. It has opened career opportunities in the Middle West whose complete airplane manufacturing are few. North American's Columbus Division still has a few openings for experienced engineers.

Comparatively young, North American's Columbus Division has already gained success that has established the organization's future. The highly regarded B-4 Navy FURY jet is a Columbus product. . . from concept through development to low production. Naturally, personal opportunity is excellent in a younger organization with opportunity goes steadily because of the association with North American Aviation, the company that has built more airplanes than any other in the world.

A SELECT FEW POSITIONS ARE OPEN IN EACH OF THESE FIELDS:

Aerodynamics, Thermodynamics, Dynamics, Stress Engineers, Structural Test Engineers, Flight Test Engineers, Mechanical and Structural Designers, Electrical and Electronic Engineers, Wind Tunnel Model Designers and Builders, Power Plant Engineers, Research and Development Engineers, Weight Engineers.

For the Full Story On Your Own Future. Write Today. Mr. J. H. Fagin, Personnel Manager, Dept. 36-AW, North American Aviation Inc., Columbus 16, Ohio.



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COLUMBUS DIVISION
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WHAT'S NEW

Telling the Market

Precision gages, gear boxes and precision switches for a wide variety of applications. Four-page, two-color, illustrated brochure. Scientific Industries, 3558 Contractors Ave., Los Angeles, Calif. Stainless steel inventory data book, giving specifications, engineering data, common constants, properties, 12 pages, illustrated. Bess-Indocon. All World Score Products Co., Inc., 321 Stewart Ave., Garden City, L. I., N. Y.

Thermocouple temperature-measuring equivalents in the International Temperature Scale of 1948 are given in Bulletin P7755, 16 pages. Wireline Instruments Div., Baker-Coleman Co., Redwood, Ill. Moisture sorption devices and boxes for applications where weight, compactness, and low-cost testing factor is needed. Catalog 913, 8 pages. Dair Products Co., 9 Avenue H, Roseton, N. J.

Standardized building construction for hangars and other aircraft structures is described in catalog, Buildings for Less, 28 pages, illustrated. Lantz Engineering Co., Bethlehem, Pa.

Thermocouple conductor specifications and recommended installations for use in operating temperatures, Bulletin 1705, 12 pages. Rayco Corp. of America, Wallingford, Conn.

Fundamentals of Acoustics, 1915 Revised Edition, provides basic understanding of acoustics for secondary students, teachers and special groups, originally published by Link Airwaves, Inc., and revised by staff of Institute of Aviation, University of Illinois, price \$1 a copy, 75 cents in quantities of 25 or more available from Nicholas A. Zdanovich Div., University of Nebraska, Lincoln 8, Neb.

How Alenore-Belt Girding Increases Production: application studies grouped according to type of aluminum belt encasing; 31 pages showing 46 illustrated color pictures. Engineering Bulletin Co., Inc., 551 W. Pacific St., Sonoma 4, N. Y. Pneumatic valve testing system for turboprop engines. Bulletin 141, Instruments and Systems Div., Nindor-Kelley Corp., Wilby St., Milford, Conn.

Wrought aluminum mill products are described in 8-page brochure showing company's complete line, 8 pages. Henry Aluminum, 10700 S. Western Ave., Tempe, Calif. Tumbling machines, screen apparatus, Nylong, modified nylon tumbling media are de-



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MARTIN
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Drives 15 lbs Alternator — Holds 400 ± 3 cps

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A new improved control permits in-flight starting if desired.

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This new addition to Stratos' line of Air Turbine Drives brings constant speed into a higher output range. Already fully qualified and flight-proven, this member of the Model TP25 are driving alternators in two of the newest aerospace systems.

Designed specifically for operation in high performance aircraft the TP25 functions with mixed air inlet temperatures of 500° F at inlet pressures over 450" HgA, ambient temperatures of 250° F and cooling air temperatures of 210° F. It is not altitude limited, operating to the service ceiling of the new aircraft in which it is installed.

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scribed in catalog. Range Manufacturer Co., Cleveland, Ohio. Stratos Model line open buildings for members and contractors, described in 56 page illustrated catalog. Great Lakes Steel Corp., Steel Mill Div., Ecorse, Detroit 29 Mich. Processes for heating and heat treatment of aluminum and other light alloys from the melt to finished product. Bulletin SC-173, Union Carbide Corp., Niagara Falls, N. Y.

High-speed recording Demandair potentiometer is described in Bulletin PT275. recorder has full-scale pen travel of 4.4 in. across 12 in. calibrated chart. Bristol Co., Waterbury, Conn. Schematic 150 Series oscillographs, recording systems, components and associated equipment performance data and technical details. Brochure, catalog. Distributed Southern Co., 199 Massachusetts Ave., Cambridge 38, Mass.

These III data processing systems, including electronic digital computer punched card converter, magnetic tape storage, automatic typewriter and punched paper tape are described in Spag. Electronic brochure. W. V. Newman, Vice President, Hughes Research Inc., 141 S. Pacific Ave., Redwood Beach, Calif. Folder on Unifac File Converter & other variations of random access storage, feature an magnetic drum, permitting instant access to as many as 1 million characters of base word data. Bulletin TM 579, Spag. & Co., 315 Fourth Ave., New York 10.

Precision Potentiometer Life & Reliability is technical paper describing what happens in operating life tracking two of a program just during its working life. Technical Paper 573, Helipot National Instrument Service, 516 Mainline, South Pasadena, Calif. Digital data transfer displays display data such as that obtained from video tracking of a vehicle along the reference track on a magnetic tape suitable, for storage, described in data that available from Potter Instrument Co., Great Neck, L. I., N. Y.

Information is available on process transducer (Bulletin MP1-1, MP1-1M, MP1-13, MP1-132) and process adapter (Bulletin PA15) from Station Laboratories Inc. 1240 W. Olympic Boulevard, Los Angeles 54, Calif. Rugged submersible valves designed for a wide variety of high pressure applications are described in leaflet available from Elgin Pneumatic, Inc., 2435 N. Western St., Burbank, Calif.

Continued connector with 35 contacts is described in Bulletin CC225 available from Hyvintec Sales Div., Defer, Avon Corp., 4501 Norcross Blvd., Long Island City 1, N. Y.

AVIATION WEEK, December 12, 1952

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Cost: 25-10,000 per unit, with differential of about 10%. Units are supplied with special tools for systems using various fluids and are designed for explosion-proof applications.

General Controls Co., Glendale, Calif.



Explosion-Proof 1.5-Hp. Motor

Explosion proof, 50V/6A, 1.5 hp. motor meets low flame designed to military specifications for aircraft use in pumps or compressor drives. Designed for continuous duty, the product operates on three-phase, 480 cycle, 200 v. a.c. Weight is given as 17 lb. A spark proof box cools the motor.

U. S. Electrical Motors, Inc., Aircraft Division, Box 2858, Torrance Avenue, Los Angeles 54, Calif.

Toggle Switch Is Fail-Safe

Heavy duty toggle switch is designed for use on radio receivers, aircraft communication systems ground for control and other applications where relays are

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7614 Maplewood Industrial Court • Suite 100 17, Missouri

Products of the R10-3 and R10-4 Gyres, Rele and Free Gyres, Differential Pressure Mach Meters, Air Speed Indicators, Computers, Switches and many other precision-built components.



not desired and selector motion must be repeated shortly.

Unit is a rotary-operated four throw, single-throw roller off device with snap lock. Contacts are used in with manual holding under contact up to 200 mg. Switch, deenergized 1850 rpm is rated at 20 amp inductive, at 250 v.d.c. for 18,000 cycles, 15 amp, inductive at 250 v.d.c. for 50,000 cycles. Switch and operate which after one channel failure, the motor reports Mission Electric Corp., 1819 Van dege Rd., Los Angeles, Calif.

Four-Way Selector Valve

Series 7500 four-way pilot-operated solenoid selector valve for 5/16-in. service use provided with ANSI 100-10-4, 4, 8 ports for 1, 2 and 3 in. tube size. Unit is available with or without internal override, three-position



spring control, two-position spring off set, three-position direct, direct ruled and with special spring and shock absorber to meet special position requirements.

Standard valves cover ambient temperature ranges of -55° to 160° under temperature spreads are available on order. Continuous duty valves are provided with single coil solenoids working in the range of 16 V. d.c. Arnold Products Co., 100 Clark Rd., Bridgeport, Pa.

Centrifuge Tests Rocket Fuses

A centrifuge that simulates rocket acceleration with inside fans for approximately 20 tests each compared with \$120 each if the item is tested on a actual rocket. New Van C unit was designed by Capt. U. S. Navy BuOrd specifications, and first time has been delivered to the Navy. It is

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also available to the industry.

Two 3-lb. specimens can be tested
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apparatus is said to reach peak velocity
in less than one-tenth of a second.
Vari-G can simulate one rocket launch
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electrical current in the magnetic clutch
and brake, the motor arm.

Standard rate includes 15 day setup
to second date. Rate from \$1,250 to
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electrical power is required.

Hvros Manufacturing Co., 264 E
Colorado St., Pasadena 5, Calif.



Sensor is Preassembled

Series GA preassembled connector for
potted modules has 40 contacts with
pin, prewired-terminated from solid
silver and gold-plated only \$1,000 in stock.

Crater screw lock, with spring ac-
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disconnect without damage.

DeJes-Aurora Corp., 4948 Northern
Blvd., Long Island City 1, N. Y.

Fuel Disconnection is Self-Sealing

Self-sealing straight-through discon-
nect for aircraft fuel and oil lines is
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Frac-Burst Lubricant seal and flow ball

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"muscles"
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PESCO HYDRAULIC PUMPS

One type hydraulic pump has built-in
integral variable displacement valve with
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PESCO pump is built-in to the
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Provides both PESCO pumps and motors power for
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Does your electronic "brain" require hydraulic or electrical "muscles"?

To assure precise functioning of automatic devices, servo mechanisms,
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Light portable towers being hoisted to top of structure, using hoisting equipment supplied. Illustrated supporting structure also available in any height up to 330 feet.

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TABLE 4 NEW ADVERT



construction is used to provide work areas working where the diamond is in the successful position.

The diamond is hand-operated and takes only one minute to be disconnected or connected with motor power up to 200 psi. Used is said to be capable of being reinserted without the diamond has been subjected to all steel and 1800 psi. MIL-C-74133, with intermittent temperatures up to 1717° F and continuous temperatures of 2102° F. E-flow and large configurations are also available.

Electro Spark Products Corp., 278 Street St., Orange, N. J.

Electrospark Tool Sharpener

Designed primarily for off-hand sharpening of single-point solid carbide and carbide tipped tools. Electrospark Sharpener sharpens without diamond wheels or abrasives. \$14.45 machine uses a 1040v. cut rate disk for a wheel, connected to work as the negative terminal of an electric circuit; the tool itself becomes the positive electric terminal.

Use of electrospark machining in stead of abrasives which makes it give life to sharpen tools of various hardness without coolant.

En-Cut-O Corp., 3200 Oldham Blvd., Detroit 12, Mich.



Time Delay Relay Takes 125C

Type 125C time delay relay is a temperature compensated thermal and operating on refrigerant up to 125° F. with time delay between one second and one minute.

Manufactured rolled and designed to operate in ambient temperatures of 125C, the product is stated to meet environmental requirements of high-



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development

design

production

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INTEGRATED ELECTRONICS

THE INNOVATION FOR RESEARCH PLUS THE SKILLS FOR PRODUCTION

Performance in the field is the real test of product worth. To ensure Hoffman's reputation for high standards of quality and performance, Field Engineers are constantly performing direct, on-the-spot and in consultation, operation, and evaluation of Hoffman electronic equipment.

Hoffman Field Engineers are chosen from the engineering design and test groups for their specialized knowledge and ability. These specially trained, specialized engineers carry the integrated skills of research, development, design, and production into the field wherever Hoffman equipment is being used... on land, at sea, or undersea.

Typical of the types of projects Hoffman Field Engineers are working on, one group is presently engaged in conducting field evaluation studies at various air bases on TACAN, the most advanced airborne navigation equipment yet produced. This field study is being conducted with Hoffman's protection at TACAN equipment.



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Conventional designs are increasingly formed during the rolling of Edgewater valves and rings, in that usually very little subsequent machining is needed. This reduces manufacturing cost, and saves material. Diameters, 3 inches to 150 inches.

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speed testing phase, including 500-cpm vibration.

Bussan Corp., Bostons, N. J.

Inverter Tester for Aircraft

Tester for aircraft inverter is stated to be designed specifically to check equipment requiring 115 v. 200-cyc. output voltage and delivering an a.c. output voltage ranging 16 v. to 115 v. a.c., with rated outputs to 5 kw., single or three phase.

User can test output voltage, output current, frequency regulation and efficiency of the inverter. Designed L-1A, it requires a 200 v. a.c. source



and weighs 175 lb. New safety cables are furnished.

Teledux Industries Corp., 35-18 17th St., Long Island City 1, N. Y.

Lightweight A.C. Generator

New a.c. generator, weighing 44 lb., is a 28 kw. three-phase, 125/200 v. and operating at 5,000 rpm—480 cycles and designed specifically for high-speed aircraft.

Product contains a class-H insulated stator portion that contains excitation from a separately mounted integral d.c. exciter generator. Cartridge air of a zero clearance magnetic suspension valve. Mounting diameter is 5 in. Generator rating is under military class-C conditions.

Westinghouse Electric Corp., 401 Liberty Ave., Box 225, Pittsburgh 30, Pa.

ALSO ON THE MARKET

Explosion-proof panelboards with dust tight construction, fusible cutout or bolt cutout or panelboards provide circuit protection and wiring control up to 125 v. All terminal blocks are located in the upper housing which is available in two sizes. The smaller terminal block, housing is used for punch-up to 12 single-pole circuit breakers (or six 2-pole breakers); the larger for punch-up to 24 single-pole circuit breakers



(or twelve 2-pole breakers). Regularly arranged for working with specially designed openings at the top. Type EWP panelboards can be furnished wired with branch connections at the bottom—Cooper Industries Co., Wall & 7th St. Streets, Syracuse 1, N. Y.

Aircraft beam balance pressure tank removes either alternate or differential pressures at rates of 100 v. of air can and can be used in the laboratory or on the production line. The mechanism used to sense the difference is a piston contained in a cylinder with one face exposed to the beam pressure and the other exposed to the pressure in question. High resolution is achieved by a photoelectric signal and control of the weight position through



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Now, the modern "weapons system" concept is applied to the development and production of rockets, missiles, and special liquid and solid propellants. Reaction Motors, Stuart Aircraft, and Otto Maschinen Company combine for the first time in part of an integrated plan both chemical and mechanical experience applicable to high-energy power generation. Coordinated by the OMAF Joint Technical Committee composed of representatives of the three companies, this unified research program is dedicated to the practical advancement of supersonic aircraft and missile propulsion.

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G-E READING LAMP gives more comfortable seeing with no wasted light



REPLACES READING LAMP NO. 1385

Passenger need no comfort with the light they need, where they need it, in places requiring lamp.

A built-in automatic reflector focuses the light in a 32-inch circle—enough to easily cover a newspaper or magazine. Illumination level is about 10 times that of bare unshielded bulbs of the same wattage since there is no light spilling out in all directions. Floating on the end of the built-in arm the light, smoothly out the beam for comfortable seeing.

Manufactured on this G-E Reading Lamp is G-1, a miniature, under the reflector it holds. Each time a lamp is changed a brighter, clean reflector is automatically washed.

The G-E No. 1385 Reading Lamp is only one of the complete line of General Electric aviation lamps for aircraft lighting. Others are No. 367, 369 Inside Fuselage, No. 369 Outside Fuselage and 311. For more information about all of them, write: General Electric—Aircraft Lamp Department, Nela Park, Cleveland 12, O.

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in Southern California,
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etc. Their long-range projects have
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Engineers

AIRCRAFT MECHANICAL DESIGN:
Extensive experience in aircraft
design, stress analysis, structural
analysis, etc. and development
of aircraft components and systems
for helicopter, jet engine, turbo
propellers, etc.

ROCKET ENGINEERING DESIGN:
Experience in design and development
of rocket engines, nozzles, etc. and
systems for space exploration,
etc.

HYDRAULIC AND PNEUMATIC DESIGN:
Design of hydraulic and pneumatic
systems for aircraft and space
vehicles, etc. and development
of aircraft components and systems
for helicopter, jet engine, turbo
propellers, etc.

STRUCTURAL ANALYSIS:
Experience in design and development
of aircraft components and systems
for helicopter, jet engine, turbo
propellers, etc.

Thermodynamicist

The industrial investigation of heat
and mass transfer processes, including
the design of heat exchangers,
boilers, etc. and development
of aircraft components and systems
for helicopter, jet engine, turbo
propellers, etc.

Aerodynamicist

Design of aircraft and space
vehicles, etc. and development
of aircraft components and systems
for helicopter, jet engine, turbo
propellers, etc.

Propellant Chemist

The design and development of
propellant systems and systems
for space exploration, etc. and
development of aircraft components
and systems for helicopter, jet
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Experience in design and development
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Mr. Floyd S. DeForest

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FLIGHT TESTING THE ANTI-SUB HSS—At Patuxent River, Maryland, the Navy has subjected the HO4S helicopter to carefully-instrumented, grueling tests. This submersible-buoy is one version of the high-performance

Sikorsky S-56. It uses electronic search gear to locate and track subs. Addition of sensing racks enables it to launch torpedoes or mines. The S-56 has twice the payload capacity of the HO4S. Rotor blades fold back for shipboard use.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS



FOR VENEZUELA—A new Sikorsky HO4S type helicopter, pictured above, has been delivered to the Venezuelan Air Force. With the delivery, Venezuela joined the ranks of 16 nations whose armed forces or commercial air operators rely upon the efficiency and dependability of versatile Sikorsky helicopters. Pilots were trained in the HO4S at Sikorsky's Bridgeport plant.



FOR THAILAND—A representative of United Aircraft Service Corporation supervises the assembly of Sikorsky HO4S type helicopter in Bangkok. The machines will be flown by the Royal Thai Royal Air Force, on low-level border patrol duty. Six of the big Sikorsky helicopters were ordered. The type has achieved an outstanding record operating in jungle and other remote areas.



HELICOPTER HISTORY



FIRST HELICOPTER AM-SEA RESCUE

In November, 1946—about ten years before the recent flood disaster in which Sikorsky helicopters saved hundreds of people—a Sikorsky HO4S made what is believed to be the first helicopter rescue. Crewmen were brought safely ashore from a storm-tossed barge stranded on Peabody reef, off Portland, Connecticut.

HELP FROM THE SKY—When fresh floods hit the northeastern states in late August, helicopters picked up nearly a thousand people and carried them to safety. People were rescued from houses being torn to pieces by savage flood waters, from hilltops, and from stranded trains and cars. In Connecticut alone, more than 500 were saved by Sikorsky helicopters. Above, a USAF Air Rescue Service Sikorsky HO4S, pictured in Pennsylvania, lifts a woman to safety as a man waits his turn at a second floor window. Helicopters were also the only source of rushing food, medicine, and rescue workers to the stricken areas.



SIKORSKY AIRCRAFT

BRIDGEPORT, CONNECTICUT
One of the Divisions of United Aircraft Corporation

Fluoroflex-T (Teflon) hose helps solve space and weight problem

for Fairchild small jet engine

Big feature about small jet engines is the good power-to-weight ratio. One of the first in this field, the Fairchild J-44 turbojet engine now uses flexible plumbing that not only saves space and weight but also withstands high operating temperatures.

Fluoroflex-T R-3580 hose assemblies were selected to do this job. And for the best of reasons: they are 550° F hoses . . . corrosion-proof . . . with small O.D., extra light weight, and over 2 years of successful operation in service.

Resistoflex is the originator and developer of flexible hose lines using a tube compounded from Teflon® and which have A-N approval in all uses for synthetic fuels, and oil, and nitric acid. Send for Bulletin FM-2

Fluoroflex is a registered trademark for products from the Fluorocarbon Division of the DuPont Chemical Company.



RESISTOFLEX Corporation
Bellefonte 9, N. J.
West Coast Plant: Burbank, Calif.

and to require less and space than spring-loaded cable-Magnetic Seal Corp., 361 Somerset Road, Broomfield, R. I.

Shipspeed transmission with changes in gears, the progression has rates of 3.2, 7.2, 11.6, 14.6, 16.6, 18.6, and 22.5 ft. Torque capacity of the transmission is 400 lb. in. Gear shafts are of alloy steel, hot treated, and gears are steel. Hydraulic shafts operate on anti-friction bearings—W.C. Carr Manufacturing Co., 3800 South Ave., Detroit 18, Mich.

Best test equipment for testing, testing gear, paper products and plastics is steel line testing equipment, enclosed motor equipped by 1 hp, 115, 125 v., single phase, 60 cycle electric motor. Model TE-5701, providing up



to 600 psi pressure, a 25 in. x 25 in. deep and 244 in. high and has a weight of 87 lb. A safety control is incorporated in the unit—Baird Air Machine Corp., 2840 N. Hollywood Way, Burbank, Calif.

Glucose chart indicator board with in spirit use a potentiometer for electrical operation. Glucose C-15 500 is supplied in either a standard format, or with output led to one or both sides for printed records. Its forward strength at zero temperature is approximately 50,000 psi. It is rated for use at 150° C. and is powered by 110V ac. Send for Bulletin FM-2, Volcanic Film Co., 1015 Birch St., Wilmington 98, Del.

Sub-miniature toggle switch, Model B-114, consists of sensitive precision Model B-114 hook switch mounted into a standard shell bracket. Push button models are available in single pole, double pole, or triple pole, double throw, service. The switch unit is approximately 2 in. long, 1 in. thick and weighs in at 1 in. lbs.—Mills Electric Corp., 1742 Berkeley St., Santa Monica, Calif.

Servo-film photoplacer, Models 1311 and 1322, reduce minimum scrubbing at high velocities, and low speed with Model 1321 acoustical acoustic external amplification of 20 aircraft speeds at an impedance load of 15

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Now a self-cooled cable heated in a control assembly designed without electric wires or complex mechanical accessories. One section with least amount of permanent wiring. Low impedance operation eliminates possibility of false alarms due to inductive effects in the new Edison aircraft fire detection system.

Another equipment development from the world famous Edison Laboratory that increases the reliability of this system is the ability to signal fire even with a break in the sensing cable.

Check these other outstanding features, too:

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- explanation—Signals "Fire Det" system—other signals separately to fire station.
- simple to install—easy to maintain—reliable—using common radio cable installation in aircraft, and these are no loose parts to connect in the event of a break.
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"where the future is
measured in days, years"

engineers. Model 1432 eliminates the need for a high speed engine. Output can be full directly to a high speed engine, providing infinite possibilities for low speed level flight at 4000 and subsonic frequencies—Sovco Corporation of America, 20-20 Jumbo Turnpike, New York 24, L. I., New York.

Aluminum alloy clock valves for 1000 psi hydraulic service have an automatic temperature range of -60 to 360°. Valves will withstand a crash of 5000 G's. For higher temperature ranges the valves can be supplied with seals for 270° F service. Model 1606 has automatic threaded ends meeting Government requirements for AN 6149-8 and AN 6257-8. Model 1616 has universal threaded ends meeting requirements for AN 6290-6—Arnco Products Co., 300 Church Road, Bridgeport, Pa.

Interferometer for measuring gap blocks to an accuracy of one-millionth of an inch employs light waves. It can accommodate 50 gap blocks at one time in a nondestructive method. Measurement can be made from zero-



ing light source, length as well as diameter and position of items is determined—Linga Instrument Co., 411 S Dearborn St., Chicago 5, Ill.

Heat and vibration resistant cable, No. 4150, withstands red heat and intense heat of aircraft waste and under gas turbines. It resists high temperatures up to 550° F in both —50° F. The manufacturer reports the cable resists fire, oil, chemical and physical wear, vibration and extreme temperatures—Wald Pumps Products Div. of General Metals Corp., 1494 Washington Ave., Huntington 4, W. Va.

Adhesive coating machine for making pressure-sensitive adhesives tape for a first application is reported to be easy to find, and economical to run and maintain. The Tapeform process includes a wide type of rollers and can be stopped and started again the very length of time. The Tapeform is a compact unit, enclosed in a metal cabinet and fully equipped for operation, does not require an electrical outlet—Williamson Adhesives, Inc., Skokie, Ill.

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Leading aircraft makers and the Military depend on Aro research and development for equipment to meet today's needs—and to be ready for tomorrow's. Nobody knows when Col. Hines' record will be broken. But it's a safe bet that when it is, Aro equipment will be aboard. For details on how Aro can serve you, write:

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ARO Oxygen Container, Gas valve—simple design and easy to use with the Aro Oxygen Container.

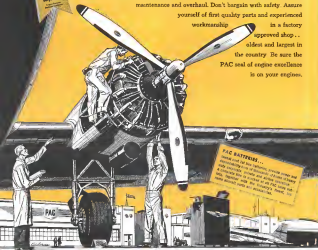


ARO Oxygen Gauge, Pressure Regulator—simple design and easy to use with the Aro Oxygen Container.



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• SAFETY

back at the end of the survey.

The Sandpiper radio operator (and cockpit crew) concluded that the aircraft had crashed in Everett Street and immediately sent out distress messages to alert Seattle and Rescue facilities in operation.

The wreckage could not be seen because of limited visibility. An emergency with a Canadian customs officer, by land, was made but from water storage, knowledge of land after considerable difficulty from radio in land water, several ocean persons who had been in the near vicinity were for about 15 hours. The other aircraft in the area was alerted by American Flight Control. They attempted unsuccessfully to light the area with flares and horns, the wreckage.

INVESTIGATION

After the accident occurred on Canadian territory, the Canadian Government assumed primary investigation jurisdiction and advised the Civil Aeronautics Board to send an official observer who immediately proceeded to the scene of the accident. Subsequently, the Board conducted an investigation of this accident and the Canadian Government forwarded the Board with a complete report of its investigation.

USAF Officer's Testimony

One of the witnesses was First Lieutenant Donald E. Baker, a USAF sergeant. Shortly after departure from Anchorage, he was alerted forward by the captain. He stayed in the cockpit until the start of land approach at Sandpiper, when he returned to his seat in the cabin.

Lt Baker advised that when one Seftis, the pilot, issued a drop in oil pressure in No. 1 engine and a rapid loss of oil. The engine was thereafter shut down. Another T2V1 (C-124) was notified of the difficulty at 0805 and 0810, and clearance was received to proceed to Sandpiper.

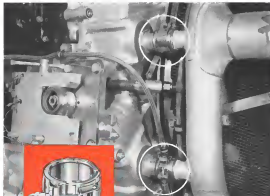
Although the flight advised that the oil engine on No. 1 engine was "bad," there was no positive means of confirming that this was the cause of the oil loss.

The captain followed company procedures in referring to land at the last available report. Much in this instance was Sandpiper's company approval of company report. Another T2V1, although equipped with better facilities, and slightly closer than Sandpiper, the land approach was not indicated, was not available for precision in landing due to poor weather conditions.

Three-Engine Crash

Shortly after the propeller was locked a small amount of ice formed on the forward cockpit window. The aircraft was climbed in three engine and level flight was maintained at approximately 1,000 feet above the passenger approach flight altitude at 1,000 feet shipping harbor an American Government in Lt Baker the aircraft flew with three engines and the crew reported no difficulty in landing. The captain flew from the left seat while the first officer made the radio contact.

Lt Baker advised that the descent at Sandpiper approach occurred in light turbulence. He thought that the approach was somewhat high and turbulence was made



Marman Couplings Simplify Manifold Installation on Lockheed T2V1 Trainer

The advantages of Marman stainless steel clamps and couplings in simplifying engine and air frame installations are demonstrated on Lockheed's T2V1 jet trainer.

The picture shows us how Marman universal head couplings connect the aluminum manifold to the J23 engine. Installation time is greatly

reduced. And, Marman V-head couplings and C15 jet air joints are used to couple the manifold to bleed off ducts.

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1 "City of Merced" leaves March Air Force Base, heads for Sacramento at 35,000 feet, 500 miles an hour

2 Approaching target area, K System (in F-4) on picture data, computer handling data, releases "bomb" at proper instant

3 Decelerate—former shows "burnt" would have landed directly on target

"CITY OF MERCED" CREW WINS SAC COMPETITION

B-47 Team Pinpoints Sacramento "Target"

THE STORY BEHIND THE STORY

It made September headlines when a team comprised "Sentry" was won by a three-man team, a Boeing jet fighter and its precision electronic equipment. The "Sentry" is the core into the actual competition to test the effectiveness of bombing and navigation by our Strategic Air Command. Top-flight crews from all bases each flew 900 miles an armed mission, demonstrating the extreme accuracy of our strategic bombers.

Picking up more points than any other team in the contest, the men of the "City

of Merced" earned the title of "the world's deadliest bomber crew." One of their runs the target was the parking center of an industrial plant in Sacramento. Flying nearly seven miles above the earth and at a speed of nearly 300 miles an hour, the "City of Merced" dropped its "bomb" within a stone's throw of the designated target.

Working all the way for the Navigation Bomb under Observer was the K Bombing Navigation System. This system, developed for the Air Force by Sperry, first sighted the target by radar. With the Observer keeping the cross-hairs directly over the target on the radar scope, the K

System automatically navigated. Saw the plane, computed for the effects of speed, altitude and wind on the "bomb" to be dropped, and then released the "bomb" at the exact instant required to insure the direct hit.

Even right competition is dramatic proof of what the Air Force is doing to overcome possible aggressors by making attacks on aggressor nations will be let surely and swiftly should it take halfhearted action. And the K Bombing and Navigation System is another example of Sperry's ability to produce equipment which helps ensure the success of military missions.

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DIVISION OF SPERRY RAND CORPORATION

★ Five-Engine Takeoff

that five-engine takeoff and initial climb in the attack was kept extended 15 seconds. Company records showed that all crew members in the bomber had completed the required training in all of these matters.

The landing strip had been closed with snowplows and had a thin coating of packed snow and ice, with braking action reported fair. The strip was helped along its length with incense flares once placed were had covered the electric light. The radio operator on duty in the bomber was in new connection with the flight director in let down and approach, and advised the flight of field conditions and local weather.

Grossed Witnesses

The only grossed witnesses were the radio operator and a Canadian customs official, who watched the approach and met of the bomber through the only open windows. The latter placed the point of touchdown at approximately one-third of the distance from the runway from the runway end, along to reference points a famous control tower over the runway, and a signal light thought that the approach appeared to be at, or possibly slightly above, normal speed and altitude. The three engines seemed to operate normally after the short landing. Acceleration appeared slow but power is being lost to sight shortly after takeoff, the aircraft appeared to be in a slight left bank.

Unsettled attempts were made to lose the aircraft to shallow water where more detailed reconnaissance might be made. Eleven minutes after the take-off the wing flaps were extended 40 degrees, the left wing panel was found to have shrouded outside of the No. 2 nacelle. The No. 1 propeller was missing in view regular and over sections from Nos. 3 and 4 engines. After a few days more my attempt was abandoned.

On June 8, 1952, a representative of Northeast Airlines and a representative of the Air Line Pilots Association arrived the same day in aircraft for field. Debate along the day yielded nothing of any significance. The aircraft was almost completely destroyed by the time the field action had occurred.

It was mentioned that both nose landing gear were fully attached. The control pedestal of the aircraft was located and tracks were found in the following positions: "Bombs 1 and 2," "No. 1," "No. 2," "No. 3," "No. 4," "No. 5," "No. 6," "No. 7," "No. 8," "No. 9," "No. 10," "No. 11," "No. 12," "No. 13," "No. 14," "No. 15," "No. 16," "No. 17," "No. 18," "No. 19," "No. 20," "No. 21," "No. 22," "No. 23," "No. 24," "No. 25," "No. 26," "No. 27," "No. 28," "No. 29," "No. 30," "No. 31," "No. 32," "No. 33," "No. 34," "No. 35," "No. 36," "No. 37," "No. 38," "No. 39," "No. 40," "No. 41," "No. 42," "No. 43," "No. 44," "No. 45," "No. 46," "No. 47," "No. 48," "No. 49," "No. 50," "No. 51," "No. 52," "No. 53," "No. 54," "No. 55," "No. 56," "No. 57," "No. 58," "No. 59," "No. 60," "No. 61," "No. 62," "No. 63," "No. 64," "No. 65," "No. 66," "No. 67," "No. 68," "No. 69," "No. 70," "No. 71," "No. 72," "No. 73," "No. 74," "No. 75," "No. 76," "No. 77," "No. 78," "No. 79," "No. 80," "No. 81," "No. 82," "No. 83," "No. 84," "No. 85," "No. 86," "No. 87," "No. 88," "No. 89," 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read by TWA that the time since worked on the engine was 750 hours and 10 minutes. Though accurate, the engine was not licensed to Northwest Airlines. St. Paul Airport Office (Nationally TWA transmitted such information direct to St. Paul.)

After 815 hours and 10 minutes of additional operation, this engine was certified as N 4542, when it had accumulated 375 hours and 10 minutes at the time of the accident, or 715 hours and 30 minutes in excess of the 1,500 hours allowed between overhauls. The jet engine reported by the flight as "broken" was one of the accessories that had been in service only 914 hours and 20 minutes.

ANALYSIS

Recovery length and conditions at Sandport were satisfactory to accommodate the DC-8, and the captain's decision to land there was therefore in accordance with good operating procedures. Under the circumstances of fuel, speed, and landing conditions at the time, the distance remaining on the runway from point of touchdown might be considered marginal, and a successful stop may or may not have been possible, the standard procedure, therefore, may have been necessary.

Although the captain's handling of the situation following landing of the No. 1 propeller was in accordance with Civil Air Regulations and emergency operating procedures it would appear that with one engine out on a solo takeoff, instrument flight, at night, and under IFR conditions, it would have been highly desirable for the captain to have prepared the aircraft and passengers for a possible ditching. This probably would have resulted in less loss of life.

Subsequent to the accident Northwest Airlines began a study of improvements in procedures and the desirability of installing additional emergency equipment on aircraft operated on overcast flights. The ditching pamphlet has been supplemented by oral briefings of passengers on location of emergency exits and how to open them, location of life rafts, how to secure them, and instructions on inflation, and personal demonstrations to groups of late passengers in the use of life vests. Similar changes relative to survival equipment and procedures have been made in the Civil Air Regulations.

Three-Engine Studies

After No. 1 propeller was lost, it was demonstrated that the aircraft had sufficient power from three engines to climb without difficulty in the clear configuration. When the power being developed at that time probably was adequate for the climb after takeoff at Sandport, although the two outboard ones are now heavily inoperative.

Of course the possibility remains that the true amount of power developed in the previous three-engine climb was not being developed at Sandport, due to possible outboard wing or other factors which would reduce horsepower output. Since it was impossible to conduct a test run and simulation of the engine, no concrete data



UNDER WAY

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sway can be made regulating their condition. Possible sea sickness could have limited wheel efficiency in the climb-inflating action, since weather conditions in Swedish were favorable to formation of light mist on the aircraft structure.

Flaps would normally retract flaps to 15 degrees for a go-around. The don't miss that the flaps appeared to be down about 40 degrees might be correct, however, the flap position may have shifted due to tide action or bending the aircraft backward. The flap handle was found in the second position which suggests that the pilot moved it from the full down position and retracted flaps during touchdown.

None of the indicators on the master's machine, but if the flaps may at 15 degrees, climb performance would have been considerably better than at a 40-45-degree position.

Manufacturer's Curves

At the request of the fleet, the Douglas Aircraft Company furnished a series of curves plotting air speed versus rate of climb for a DC-8 operating on three engines at rated thrust power and with the propeller locked on the propulsive engine.

Without consideration of ground effect, these curves were constructed for an load of a gross weight of 65,475 pounds, the maximum weight of Flight 214 at the time of the accident. They show that the best rate of climb with 45-degree flaps and landing gear down would be 11 feet per minute at approximately 15 miles per hour; however, ground effect in approximately the last 40 feet of altitude would increase the rate of climb appreciably.

With 45-degree flaps, gear up, the best rate of climb would be 200 feet per minute at about 145 miles per hour; 400 feet per minute could be realized with 10-degree flaps, gear up, at an airspeed of about 155 miles per hour.

Thus from the time the aircraft first began to climb to the time that the landing gear was fully retracted the rate of climb would have been low. At no specific time before and above these points, the rate of climb never fell off rapidly.

In considering the light characteristics of the accident at the applicable angle, a climb would have been possible with flaps extended 40 to 45 degrees if proper airspeed were maintained, three engines continuously developed rated thrust power, the engine was free of ice and the landing gear retracted without malfunctions.

Buffeting Present

It often is noted that in buffeting buffing was present and that the results were very near the stalling point during the attempted go-around. He also showed test data that at impact was rapid but not violent. This could indicate that the air speed of the aircraft was low and stall effect was negligible. Thus St. Baker's testimony indicates the possibility of a stall-induced wing stall.

It is interesting to note the wing stall



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tion system corrected during the attempted
maneuver it is likely to have caused injury
at the main actuating the nose wheel will
down. The down float could have caused
the ballast which is float around. A
particle attracted nose gear would also
cause deterioration of the climb perform
ance.

The evidence that the nose gear was loose
from the airplane while in the up and locked
position does not preclude the possibility
of malfunction. Some experience indicates
that extension of the landing gear after nose
gear malfunction, followed by a rapid
retraction, usually results in completion of
the extension cycle. The time interval be-
tween the lift-off and the main gear prob-
ably sufficient for the above sequence of
events.

The directional controllability of the
DC-4 during these rapid takeoffs is such
that the effect of a fully deflated motor is
negligible in comparison to the steering
moment due to the conventional thrust of
its speed appreciably below the take-off
speed.

At a time pulling the nose wheel off
the ground as an attempt to take off at
these low speeds results in the upward
steering of the nose gear in the air, the
aircraft did not slide the nose back
along the runway, it is apparent that the
lift-off was not made at any speed appreci-
ably lower than the recommended lift-off
and climb speed.

In regard to the operation of No. 1 engine
it is obvious that the engine was not
braked to maximum allowable overhead
power because of a closed valve of con-
sumption. A temporary stall incident that was
quite perceptible occurred from 700 ft. was
generally newly accelerated climb, it was ap-
parently caused by the St. Paul Floating
Office where such records are kept that a
complete overhaul had been accomplished
on this engine.

It further appears that the closure of
the engine was sufficient attempt to correct
the overhead limitation. The evidence
does suggest the cause to occur here have
corrected by the closure in the intention
of the CNA.

FINDINGS

On the basis of all available evidence, the
Board finds that

1. The company, the aircraft, (with the
exception of engine components of No. 1
engine), and the crew were properly certified
and
2. The No. 1 engine suffered an oil loss,
which accelerated starting during the engine
and feathering the propeller.
3. In accordance with company operating
procedures, the engine started to land at
the last available airport, rather than con-
tinued to destruction in the engine.
4. The landing of Lockheed was aborted
and a go-around was attempted.
5. When the observed in a go-around was
seen, the aircraft was in a shallow left bank
at low altitude.
6. During the attempted climb-out, the
aircraft entered into the higher, lower, and
came to rest 25 degrees to the left and ap-
proximately 4,300 feet from the end of the
runway.
7. While all or nearly all of the pas-

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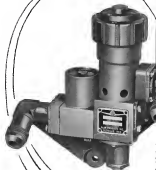
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ingenie estimated the aircraft with no known actual altitude, although had reports at around 30,000 feet due to poor temperature and water temperature.

3. No steps were taken to prepare passengers for a crash-landing as possible ditching.

4. Emergency lighting in the cabin was not utilized, nor was any effective means taken to use the exits stored at the rear of the cabin.

PROBABLE CAUSE

The board determines that the probable cause of the accident was a total gas system difficulty in conjunction with an icing condition on a power line, which made the aircraft incapable of maintaining flight.

By the Civil Aeronautics Board.

Ray E. Baker
Joseph P. Adams
John Lee
Harold D. Denny

(John Gentry, Member, did not participate in the adoption of this report.)

SUPPLEMENTAL DATA

Investigation and Hearing

The Civil Aeronautics Board was notified of this accident by CAA Communications at approximately 9:30 on January 15, 1952. An investigation was immediately initiated by the Department of Transport of the Canadian Government and its associates with presidents of the International Civil Aviation Organization, a representative of the board participated as an official observer.

The board's investigation proceeded concurrently with the Canadian investigation and was immediately initiated upon notification of the accident in accordance with the provisions of Section 705.01 (1) of the Civil Aeronautics Act of 1939, as amended. A public hearing was ordered by the board and was held at the Department of Transport, Ottawa, Ontario, Canada, on April 24, 1952. An invitation was extended to the Canadian Government for one of its representatives to attend the board's hearing, and so official of the Department of Transport was present in its absence. The hearing was held at St. Paul, Minnesota on August 30, 1952.

Air Corridor

Northwest Airlines, Inc., is a Minnesota corporation, with its principal office at 1655 University Avenue, St. Paul, Minnesota. The company is engaged in the transportation by air of persons, property, mail and under certificate of public convenience and necessity issued by the Civil Aeronautics Board, and air carrier operating certificate issued by the Civil Aeronautics Administration to the operation of the route described in this report. Northwest Airlines operates daily flights across the North Pacific, maintained by a contract with the U. S. Air Force, the flight involved was such a military contract flight.

Flight Personnel

Captain John J. Phillips, age 38, was employed by Northwest Airlines, Inc., on August 4, 1942. He was the holder of a valid airline certificate with an air transport rating for multi-engine land aircraft. Captain Phillips had a total of 2,517 flying hours, of which 1,742 were as DC-4 captain, and 1,137 hours of instrument flying time. His last instrument check was accomplished on October 12, 1951, and his last post check was given on November 17, 1951. Captain Phillips received a CAA physical examination on September 24, 1951.

First Officer Kenneth H. Kuba, age 32, was employed by Northwest Airlines, Inc., on September 13, 1949. He was the holder of a valid airline certificate with commercial pilot and instrument ratings. He had a total of 4,137 flying hours, of which 1,979 were as DC-4 captain. He had CAA physical examination was on Aug. 28, 1951.

Stevenson, John Charles, had been employed by NWA, since April 1, 1950.

The Aircraft

N 474C, a Douglas DC 4 (C-54B) Serial No. 27179, owned by Trans World Airlines, Inc., was operated on lines by Northwest Airlines. It had a total of 38,419 flying hours and was currently maintained by the Civil Aeronautics Administration. The aircraft was equipped with four Pratt & Whitney R-2800 engines and Hamilton Standard T25E1 propellers. A No. 2 check on the aircraft was completed at Seattle, Washington, on January 12, 1952.



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Turbo Oil 35, a synthetic product, is the only gas turbine lubricating oil approved by Rolls-Royce, makers of the four "Dart" turbo-prop engines powering the Viscount "340" Series.

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PHOTO BY L. L. LLOYD FOR AVIATION WEEK

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When the pilot completes his cockpit check list and engages the starter, the R-57 is off the runway in the fastest time possible. Because Olin Starter Cartridges supply constant, reliable starting energy at the flick of a switch. With split seconds after the difference between success or failure is an aircraft's safest return, designers and engineers now increasingly look to solid propellants in the easy-to-carry, easy-to-use, never-to-fail starting combination (ground necessary equipment).

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AIR TRANSPORT

New Route Awards Compound Congestion

Branniff, Delta to operate New York services from Newark; more jamming is only aspect elsewhere.

By Preble Steiner

Washington—The critical problem of downsizing airport space has been further complicated by recent Civil Aeronautics Board decisions authorizing new points of service for 10 of the 11 domestic trunk airlines.

The new services put additional pressure into the nation's three leading air traffic centers: New York, Chicago and Washington. Other cities are facing space problems to a lesser extent. New Orleans also are placed on an already straggled air traffic control system.

Plan are present plans to handle the new services in the congested areas:

- **New York:** Delta Air Lines and Braniff Airways, newcomers to the New York market, will operate from Newark Airport. LaGuardia Field and Idlewild International are unable to accommodate the two carriers.

• **Chicago:** Midway Airport will be used instead to handle Continental Air Lines, only new carrier operating into Chicago. Other carriers are scheduling additional Chicago services. There is ample space at O'Hare Field, but the carriers have been reluctant to start the move to O'Hare due to absence of a required modification of approach order (ASR-15) and the addition of military jet operations. Jet fighter squadrons are based at O'Hare but it is hoped that by an agreement this activity will be held to less than 15% of the total jet traffic.

• **Washington:** More crowding at crowded National Airport is the only immediate answer to handling Delta and Braniff. New construction, scheduled for completion in 1975, will increase capacity 10 to 15%. "Right now, everyone will have to move over," Braniff's Billie, Washington National director, said.

Newark Faces Load

John R. Wilke, airline director for the Port of New York Authority, said, "We have plenty of space available and operating conditions are good at Newark." Wilke pointed out that Capital Airlines recently moved four flights daily into Newark after an absence of several years.

Newark has adequate counter space, ample office facilities and 22 gates, of which 16 are control buildings. Addi-

tional space can be easily provided at Newark, Wilke said, since the new terminal was designed for expansion.

LaGuardia long ago reached the saturation point in its design. LaGuardia is unable to handle DC-7s and Super Constellations because of weight restrictions on runways. The situation at Idlewild is comparable to LaGuardia, but construction now under way will help alleviate the space problem.

Chicago's O'Hare and Midway airports probably will split the surface traffic but so far less than 10% of the scheduled have been moved from Midway to O'Hare. One effort to alleviate congestion at Chicago has been CAA's refusal to allow the air carriers to serve both airports on the same flight.

Washington National had only three airline tenants when it opened in 1941. Today there are 15 scheduled airlines operating from National and Braniff and Delta will soon make 12 airlines among Washington. Traffic has soared from 6,131 flights in July 1941 to nearly 20,000 flights in July 1975, an average of 750 flights daily.

Bunched Schedules

Scheduled new construction has been underwritten, but is lagged at least a year behind the requirements. A recently completed terminal expansion, which added five gate positions to the 18 available, has not met the demand.

Newark's position is not so idealized. Carriers operating from Washington schedule their flights at nearly the same times—only morning, mid-afternoon and early evening. "We can't get better take-off times unless there is more of a spread in the traffic," Condit said.

The impact of added service at Washington may open action for a second major airport. CAA proposed a second airport at nearby Reston, Va., and Congress appropriated money to buy land, but its withheld construction funds because of congressional pressure. The Maryland congressional delegation opposes the Reston site, and says more Baltimore International Airport (Ft. Meade) which would be between Northern Virginia and Washington. A local airport, including a proposal for a new airport, is a possibility because of the proximity of these constraints they do not want it located there.

Pittsburgh, despite much heightened anxiety and a new terminal building, will have some trouble placing American Airlines and United for Lanes in new service routes. Airline operators are different, Pittsburgh's location at its point and military status. Two military operations are based there and efforts are being made to move in case.

Denver's Stapleton Field is striving to solve space problems and air traffic control is encountering difficulties. From World Airlines moves into Denver is an intramarket point for long haul services. TWA also has pointed to its and Oldenburg City.

Shoring Airspace

Once the carriers make their report requirements completed, an infrastructure will find flight schedules another problem on the airways is well as at the airports. CAA air traffic control officials recognize the burden of the additional traffic, but believe it can be mitigated with other traffic.

Mixing air traffic control problems will be in the southeast. New York metropolitan area, including New York, represents 25% of all air traffic in the country and it is increasing. Over 2,800 flights daily are handled from the New York City area airports which operates with Europe's busiest airports as carrying a daily traffic load of only 600 to 700 flights.

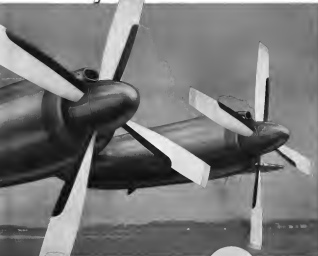
Four new airline routes will start after the first of the year between New York and Washington, the nation's busiest route.

As part of their own move from the southwest to the northeast, Braniff and Delta will operate through Washington to New York, while Capital Airlines and Trans World Airlines will fly the last line operate between the two cities as extensions of present services. These carriers must share the airspace with

Movie Indoctrination

New airline enthusiasts by the Civil Aeronautics Board has worked to limit the influence of top of aviation process the new airport administration and construction of pilots. A number of carriers plan to add CAA for emergency in use this in meeting pilot request quality education requirements. The focus is on the training over the number of members of training first crew would be substantial savings in time and money.

Capital Airlines



1945

The First Turbine Aircraft
to fly used ROTOL PROPELLERS

1955

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Board Orders New Procedures, Equipment for Plane Evacuation

Washington—New rules for emergency exits and equipment, including a life vest demonstration, will be required after May 31, 1956. The briefing will have to be done before the aircraft reaches the ocean or port area of its flight.

Rule changes which call for structural alterations of aircraft interiors, due in 18 months, but procedural changes will be required to meet an interim.

The CAB goes on to say that the Civil Aeronautics Administration and the Department of Navy are considering an investigation of ditching procedures which includes not only life suits as part.

The Board will wait for the life suit criteria to be developed before setting rules on ejection.

The Board also expressed concern over the lack of a light for life vests and life rafts which would alert flight attendants. A requirement for such a light will be considered when such equipment becomes available.

83.1 Million Voted For PNYA Airports

The Port of New York Authority will spend \$12,475,543 in 1956 to improve LaGuardia, Idlewild and Newark

A passenger briefing in the case of emergency exits and equipment, including a life vest demonstration, will be required after May 31, 1956. The briefing will have to be done before the aircraft reaches the ocean or port area of its flight.

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Airports. Among the improvements: LaGuardia's drainage system will be improved at a cost of \$1,851,000 with the installation of four pump houses, additional drains and ball-balls, and raising the airport perimeter dike elevation to 15 ft.

New York International (Idlewild) will receive \$6,000 for electric wire and cable to light roads and buildings in its south building terminal under construction (AW Feb 25, p. 57).

Newark Airport will get \$1,443,444 for a new 1400-ft. runway, taxiway, new security parking positions and for the widening of the apron at Bower's hangar from 300 to 400 ft. Also, a paved runway area will be built at the west end of Runway 11-29 and a dual power supply for the airport's new ASEA surveillance radar will be installed to cut an automatically should the primary power fail.

Tahiti Route Planned

Sea Fareways-Dollar Airlines, Inc., last week announced acquisition of South Pacific Air Lines, Inc., and plans to inaugurate weekly flights to and from Honolulu and Papeete, Tahiti, with 40-passenger Boeing 367-100 flying boats.

The U.S. flight via Johnston Island are scheduled to begin next summer.

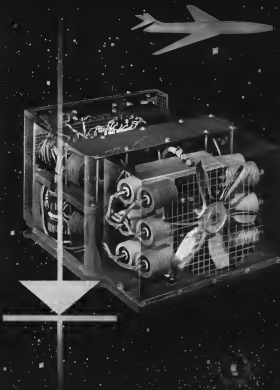
The shipping firm also said its plans to expand South Pacific's operations through charter flights to New Caledonia and New Hebrides, the Cook Islands, American Samoa, Easter and Fanning.



Super Connie Over Times Square

In a bid for a greater share of the lucrative New York market, TWA is entering the sale with Lockheed Super Constellation (48-000) over a 73 ft x 200 ft -derivative sign bearing both TWA World Airlines' and Lockheed logos. The Constellation has a 40-ft wingspan and a 40-ft long

TOMORROW'S AIRCRAFT: *One step closer*



NOW!

d-c power without problems

Up to 200 amperes of 28-volt d-c output is available from the new Westinghouse silicon power supply using power from the a-c generator. Now, aircraft designers no longer need to plan two engine pads when both a-c and d-c loads must be served.

The new d-c power pack handles the d-c load without the problems associated with brushes, bearings or commutators, operating at high altitudes and high temperatures. The a-c motor blower has specially selected bearings for this application. The efficient cooling resulting from use of this motor eliminates heavy, bulky components. Another link has been cut in freeing aircraft electrical systems from the limitations of their environments.

Key to the success of the new system is the use of silicon rectifier cells with an amazing 96 percent efficiency. Greater amounts of power can be rectified with improved performance and reduced weight and size because of the development of the large-area silicon diode. This, combined with multiple transformation and a MAGAMP® magnetic amplifier control scheme, provides a unique power supply for reliable aircraft applications.

Designs now ready for production range from 50 to 200 amperes d-c output, with less than plus or minus 1-volt regulation, if desired. Continuous-duty, full-load operation is guaranteed in ambient temperatures ranging from 130°F at sea level to 175°F at 50,000 feet.

Adjustment and maintenance are reduced to a minimum. Higher altitude ratings and special designs may be negotiated. This new Westinghouse development will help you bring tomorrow's aircraft... One Step Closer. Westinghouse Electric Corporation, Aircraft Equipment Department, Lima, Ohio.

AN-56

Electrical in the 200-ampere, 28-volt, regulated unit. For answers to questions on silicon power supplies, call your Westinghouse sales engineer.

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YOU CAN BE SURE...IF IT'S

Westinghouse



Large-area silicon diode cells such as these are the heart of this outstanding new transistorized rectifier system for supplying d-c to aircraft. They offer higher efficiency, lighter weight, lower maintenance, greater reliability and longer life.



The MAGAMP® magnetic amplifier control scheme in the new d-c power pack employs these magnetic amplifiers to maintain plus or minus 1-volt regulation. This control has no moving parts and is virtually maintenance-free.



Mr. E. G. Austin, the holder of over 75 patents, has successfully led the pioneering of many developments in a-c and d-c aircraft system technology. Lest in the line of achievement is the new silicon power supply.



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propeller turbine aero engine to fly.*

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*A Rolls-Royce propeller turbine
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CAB Orders

GRANTED

Leave to introduce in the Puerto-Rico service out to the City of Houston and the Houston Chamber of Commerce.

Fin American World Airways in exception to new situation in New York, Tex., on flight staying cargo and mail only on the coast's San Francisco-Los Angeles-Gasparilla City route. This American is prohibited from carrying local traffic between the U.S. ports.

Continental Airlines in exception to regular between its Omaha, Ark., and St. Louis via Fort Worth and Kansas, Ark., until they stop after leaving in an exception of service between the points.

Aero Finance Corp. in exception to perform a flight from Miami to Kingston, Jamaica, pursuant to a contract with the Lloyd's of London.

Midwest Airlines permission to serve Peapack, N. Y., through Detroit, Chicago, and New York.

Stark Airlines permission to serve Oklahoma City through Will Rogers Field.

APPROVED

Southwest and Western Airlines and Air World Leases, without agreement, serving the DC-4 and two Super Constellation aircraft.

Fin American World Airways, Air France, and British European Airways agreements involving service between Berlin and other in West Germany.

Agreements involving American Airlines, Qantas, Air Lanka and various other airlines relating to international air service.

Los Angeles Airways flight pattern extending service from Pomona to San Bernardino via Ontario and Riverside and at closing Sunday in the flight schedule. The flight pattern adds a passenger round trip between Los Angeles and Anaheim on Sunday and a passenger and cargo flight daily from Los Angeles to Anaheim and Santa Ana.

Switzerland, Switzerland, between East and West Lines, Lancaster & Bucklefield and Naval Engineering. Approved immediately at first on any professional financial or other business transactions between Eastern and Soviet.

ORDERED

Fin American World Airways and Northwest Airlines' final mail rates for Pacific operations set at the rates proposed by the Board for the period Jan. 1, 1954 to Jan. 31, 1955.

North Central Airlines final mail rates set at the rates proposed by the Board for the period ending Dec. 31, 1955.

North Central Airlines final mail rates set at the rates proposed by the Board for the period ending Dec. 31, 1955.

North Central Airlines temporary authority to serve or alternate service at various points extended.

Continental Airlines final mail rates for Pacific operations set at the rates proposed by the Board for the period Jan. 1, 1954 to Jan. 31, 1955.

Continental Airlines temporary authority to serve or alternate service at various points extended.

Lake Central Airlines final mail rates set at the rates proposed by the Board for the period ending Dec. 31, 1955.

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ordered three Victory Vought 380 aircraft, bringing total Vought sales to 212.

North Central Airlines had a net profit of \$115,386 after taxes for the first ten months of this year, compared with \$23,015 for the same period last year. Revenues for the 1955 period were \$4,301,715.

Fin American World Airways has lost flight time between Miami, Managua, Nicaragua, and San Jose, Costa Rica nearly in half with a new nonstop DC-68 service that is scheduled for 3 times a week. Flights Miami to Managua and 5 hours 15 minutes to San Jose.

LOT, Polish Air Lines, is sending a delegation to Washington this month to sign an agreement calling for an increase between Warsaw and Detroit via Budapest. The service is expected to begin before the end of this year with a schedule of two round-trip flights a week.

Qantas Empire Airways plans to use first class fares next spring on all routes but those between Australia and South Africa, East Asia, New Guinea and New Zealand.

Shortlines

Air Transport Association reports the Air Line Clearance House transferred business of \$15,000,000 in October, an increase in business of 21% over October 1954.

New Zealand National Airways has



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COCKPIT VIEWPOINT

By Capt. R. C. Roberts



Rainy Night Over New York

(Part II)

(This is the first of several columns on air traffic control. It is an accounting of operations at a specific date and place. By using this actual example and describing the "how" as well as the "what" to assist the true nature of our sophisticated air traffic control.)

The night of October 30 was just as average, run-of-the-mill working day for traffic operations on the East Coast. By using this actual example and describing the "how" as well as the "what" to assist the true nature of our sophisticated air traffic control.

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165 Galters for Delay

This left a balance of 165 gallons to take care of the expected normal delay at LaGuardia, possible additional flying time caused by a radar departure from Boston, higher than normal fuel consumption if icing was encountered and the possibility of an assigned altitude above 6,000 feet.

This call was made at approximately 2000 and, as expected, a radar vector zero from Logan Airport commenced a few extra minutes of fuel at high climb power setting. Shortly thereafter, a clearance was received from Boston ATIS to climb to 12,000 feet. This required an additional 24 gallons beyond planned requirements.

Flight 901 was "on top" at 10,000 feet but, on morning Hartford, went on instrument again. Coldest air was noted, and the application of fuel trend fuel consumption slightly above the normal 175 gph. Aircraft was extremely light. After passing Hartford, heavy snow was encountered, then occasionally, lightning, light but not light to moderate turbulence. In about 10 minutes, the flight was again "on top" in relatively smooth air.

At this point (the time was now 2251) the New York Center was contacted and a clearance was received to hold northeast of the Wilton (Conn.) VOR. An expected approach time of 2445 was given—a delay of approximately one hour.

This obviously presented a fuel conservation problem. Accordingly, rpm and manifold pressure were reduced to an absolute minimum and holding was accomplished at a power level above the stall speed of the aircraft. Still holding was occasionally felt, and it was necessary to make altitude work, but turn in order to maintain altitude. In this configuration it appeared that there would be sufficient "stick" to wait out the delay, which eventually totaled one hour and five minutes.

Jet Operation "Waits"

Here then are the first requisites for a future air traffic control system—the no shadow "waits" for jet operations.

It must be possible to forecast the expected approach time in at least two hours to advance; and that time must be fairly accurate. Within a few years the practice of pumping in a few extra hours of holding time will be obsolete.



Peace Officer ready for war

This man is a peace officer. His beat is the whole world, for he flies for TAG—the Tactical Air Forces of the U. S. Air Force.

Primary job of the Tactical Air Force is to snuff out "brush fire" aggressions wherever they may occur. This is being accomplished by maintaining at combat readiness a completely self-contained striking force with a devastating nuclear punch, and a global reach.

Such a far-reaching assignment calls for versatility in men, equipment, techniques and weapons. Douglas is proud to have its planes included in the Tactical Air Command's inventory of fighters, bombers, transports and reconnaissance aircraft.



Defense is everybody's business

The Douglas B5-B can fly 600-700 mph but not without people to pilot and service it. The Air Force needs young men and women who agree that "defense is everybody's business."

Depend on DOUGLAS



First in Aviation

A Pattern for Improvement

(Review of an internal report issued to Assistant Secretary of Defense for Research and Development, the following excerpt from a recent speech by Dr. Clifford C. Francis, one of special importance in the aircraft industry: the topic of the distribution of a core research holding at the General Aeronautical Laboratory, Buffalo, N. Y.—Robert Hott)

Military developments have in the past led to many profound peaceful benefits and can well continue to do so in the future—even at an accelerated pace, if we will but put our mind to the task.

It will be noted that while the development thrust on military stimulus and support, the fundamental research, in nearly all cases, came from non-military sources. Is this a condition of weakness in our national structure? It could well be—at least the possibility is worthy of exploration.

Since the beginning of World War II, the implements of war have become vastly more scientific and can placated than they ever were before. Our solutions to fundamental knowledge are not keeping pace with the tempo of practical applications. I would not say that we are lacking in knowledge of fundamentals, but the basic balance is giving a little this.

There is a substantial amount of talk but, as yet, inadequate action. However, the virus of concern is slowly spreading throughout industries, universities, research foundations, military establishments and civilian Government agencies. It is possible that the by-product will soon be evolving into real service. The National Science Foundation, with proper support, can become an increasingly significant factor. Various industries can help tremendously, though they will probably be slow in going about it. Increased industrial as well as Government support of fundamental research in universities cannot help but be beneficial. The military establishment also has its rightful fields in the fundamental research area.

Constant prodding by the disciples of research is beginning to obtain positive response. My only question here . . . is to encourage the trend and to point out that a really sound fundamental program will, in the long run, add greatly to our military strength, as well as to the potential for winning the peace.

If we are to get best results from our dollars as well as from our research talents, there must be a pattern of continuity to match the length and difficulty of the task. For a variety of reasons a step-and-go pattern often characterizes some of the important military programs. To make maximum progress on missions feel one needs an open highway with no stop lights.

Given ample time, most of the peaceful potentials of military developments are eventually forthcoming, but the lag in having the rewards also placemats is usually years—if not decades. It seems quite obvious that if this transition period could be substantially shortened, the time of peace would be greatly strengthened, both at home and abroad.

There are various roadblocks which militate against the rapid transition. The first which comes to mind is the matter of military security. Technical information which might be of aid to a possible enemy must naturally must be kept under wraps as long as that possibility exists. However, security systems have a great lag and inertia and some developments are kept in the secret category long after such precautions are unnecessary or meaningless.

The second roadblock is the very business which is usually associated with military development. Most of the important Department of Defense programs call for a schedule that runs between "mild" and "fierce." Hence, from a sense of duty, if not by contract provision, the organizations involved practically exclude their ideas from going through or effort to the existence of developments to nonmilitary uses. Unquestionably, this impeding demand on the part of the military establishment is well founded, but that need not exclude parallel efforts. As long as we are at peace there is a tremendous amount of scientific and engineering talent in industry and in civilian laboratories which is being applied to civilian ends. Without going into details, it certainly does appear that better coordination between the two types of activity and a bit of systematic planning should make it possible to construct frequent cross-over bridges between the two parallel lines of activity. If the character of communication are open and the level of motivation is high, it should be possible to permit development for civilian application without retarding the military program, even though really capable scientists and engineers are definitely in short supply. I am not in any way advocating that any persons who are needed for the military program should be pulled off those projects. I am only suggesting that it would be in the national interest in many cases to step up the encouragement and accelerate the flow of information of using military research results to various channels of civilian application. There is such a flow now, but it could be substantially increased.

The third barrier I would characterize as the NIH (Not Invented Here) factor on the part of industry. "If the item didn't come from within our own organization, well buttressed with our own proprietary position, it can't be any good—at least not for us." Certainly the American system does depend upon the self-contained drive of the enlightened self-interest of competitive industrial organizations. However, this state of mind can lead to similarity and, hence, to provincialism. If this thinking dominates an organization, it tends to be self-defeating. I firmly believe that this characteristic of the narrow attitude of many industries does greatly slow the progress of the wider utilization of many developments. You don't change attitudes by effort, but sometimes it does help to bring them out in the light and look at them. . . .

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To MATS' 1700th Test Squadron — Congratulations for a good job well done.

This month, the final hour will be flown on a program which has as its target 3000 flight hours by January 30, 1956 on two Convair YC-131C aircraft powered with Allison Turbo-Prop engines and Aero products Propellers. The program will be completed more than 30 days ahead of schedule — thanks to the skill and enthusiasm of the pilots and crews who were given the job to do.

The aircraft were delivered to MATS at Kelly AFB, San Antonio, Texas, in January, 1955. The 1700th Test Squadron had just been activated and was composed of men who not only were outstanding in their abilities but who demonstrated a genuine enthusiasm for Turbo-Prop transports in military aviation.

Colonel Claude Smith, Commander 1700th Air Transport Group, and his staff immediately initiated a familiarization program for all personnel and the entire squadron set out to obtain maximum time on the two aircraft. The object was to prove the place of turbo-prop-powered transport in military aviation.

Hours on the aircraft mounted rapidly. Sometimes the planes shuttled between Kelly AFB and Travis AFB, or to Andrews, or to the Allison plants in

Indianapolis. And many days went by with pilots making operational flights over Texas. Three and four flights a day with five hours per flight became routine. And in one 24-hour period, each aircraft was kept in the air for 23 hours and 10 minutes. It was long, hard work for pilots in the air and crews on the ground. But they kept at it — determined not only to beat their schedule but to demonstrate convincingly to others the firm, determined faith they have in the future of turbo-prop power.

Under Lt. Col. Samuel C. Burgess, Commander, the work of the 1700th Test

Squadron will continue with other aircraft powered with turbo-prop engines. But the pioneering phase of the program is concluding. The rest of the program has been aided immeasurably by the experience gained with the first aircraft assigned to the project.

We at Allison salute the good work of the men of the 1700th Test Squadron. We are proud to have been part of the project. You have proved that turbo-prop engines and propellers are "ready to go" and we are gratified that the convincing demonstration was made with Allison Turbo-Prop engines and Aero products Propellers.

